QUALITY ASSURANCE PROJECT PLAN

MULTI-SITE BROWNFIELD INVESTIGATIONS

CITY BLUE ISLAND HAZARDOUS SUBSTANCES BROWNFIELDS ASSESSMENT PROJECT - TOD AREA REDEVELOPMENT
BF-00E42601-00

BLUE ISLAND, ILLINOIS

REVISION 0

February 2009

Prepared by:
Earth Tech AECOM, Inc.
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Chicago, IL 60606
(312) 777-5500

Prepared for:
City of Blue Island and USEPA Region 5

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U.S. EPA BROWNFIELDS ASSESSMENT GRANT-

'Hazardous Substance'

City of Blue Island Brownfields Assessment Project - TOD Area Redevelopment
BF-00E42601-00
AWARD DATE: October/2007

On behalf of the City of Blue Island, this Quality Assurance Project Plan (QAPP) was prepared by AECOM Environment (AECOM) for the Brownfields Assessment Project. The QAPP was developed following the guidance presented in the United States Environmental Protection Agency (U.S. EPA) document QA/R-5 *Instructions on the Preparation of a Superfund Division Quality Assurance Project Plan*, dated June 2000.

8/6/09
Deborah Orr, U.S. EPA Project Manager

8/6/09
Jan Pels, U.S. EPA QA Reviewer

Jodi Prout, Community Development Director, City of Blue Island, Grantee Project Manager

Bryant Williams, AECOM Environment, Project Manager

Sarah Monette by RW
Sarah Monette, AECOM Environment QA Manager

Arminta Priddy, EMT, Laboratory Project Manager

QUALITY ASSURANCE PROJECT PLAN DISTRIBUTION LIST

The following have received a copy of this Quality Assurance Project Plan:

Jan Pels, U.S. EPA QAPP Reviewer

Deborah Orr, U.S. EPA Project Manager

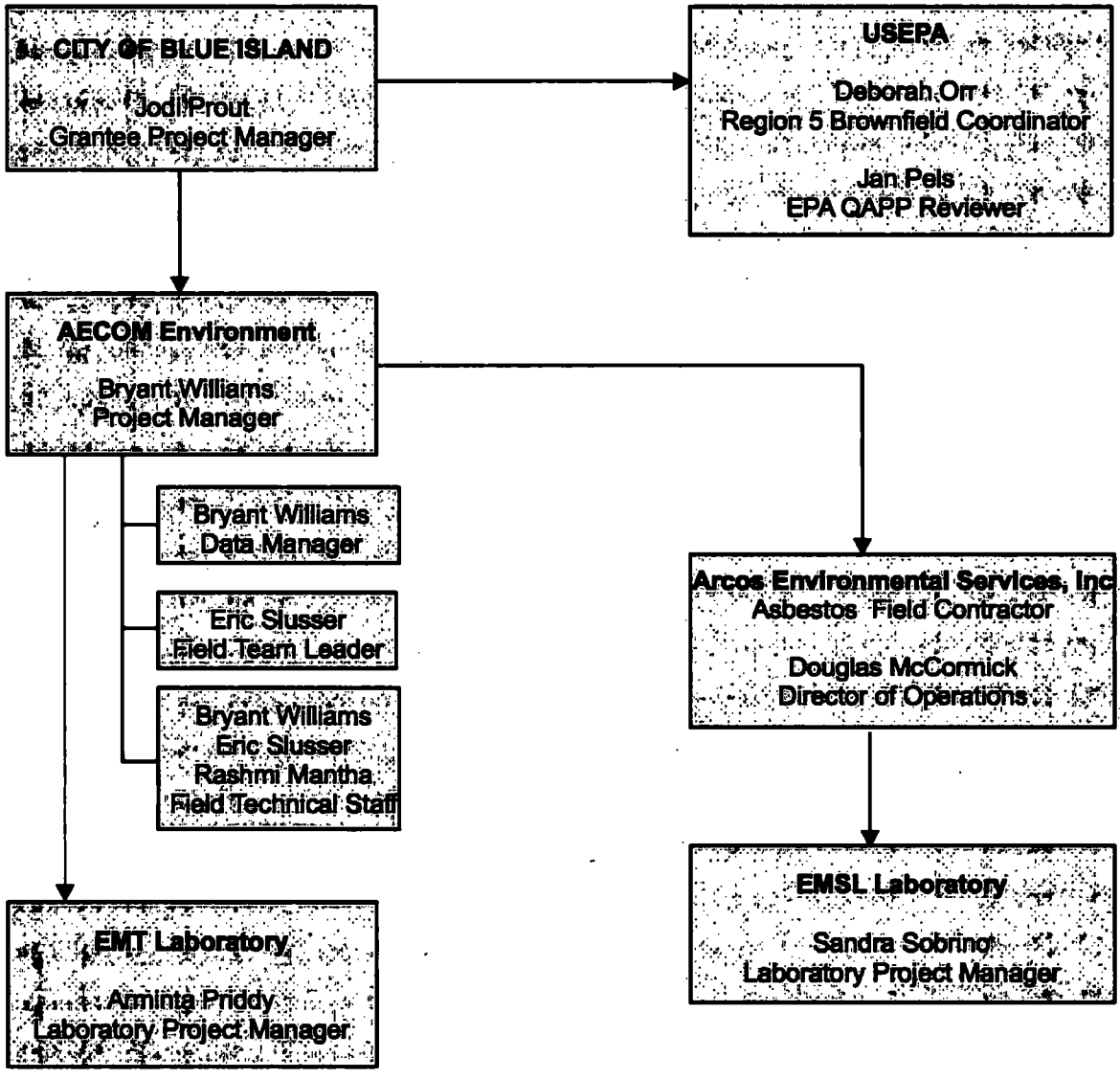
Jodi Prout, City of Blue Island Community Development Director

Bryant Williams, AECOM Project Manager

Sarah Monette, AECOM QA Manager

Arminta Priddy, Environmental Monitoring and Technologies, Inc Laboratory Project Manager

FIGURE 1: PROJECT ORGANIZATIONAL CHART
CITY OF BLUE ISLAND TOD REDEVELOPMENT AREA BF-00E42601-0



ACRONYM LIST

ACM – Asbestos Containing Material

AHERA – Asbestos Hazard Emergency Response Act

ASTs – Aboveground Storage Tanks

ASTM – American Society for Testing and Materials

AECOM– AECOM Environment

CFR – Code of Federal Regulations

CNS – Covenant Not to Sue

COC – Chain of Custody

DI – Deionized

DQOs – Data Quality Objectives

DRO – Diesel-Range Organic Compounds

GRO – Gasoline-Range Organic Compounds

HASP – Health and Safety Plan

HUD – U.S. Department of Housing and Urban Development

IEPA – Illinois Environmental Protection Agency

LCSs – Laboratory Control Samples

MDLs – Method Detection Limits

MS/MSD – Matrix Spike/Matrix Spike Duplicate

O&M – Operation and Maintenance

OSHA – Occupational Safety and Health Administration

PARCCS – Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity

PCBs – Polychlorinated Biphenyls

PE – Performance Evaluation

PID – Photoionization Detector

PPE – Personal Protective Equipment

QA – Quality Assurance

QAPP – Quality Assurance Project Plan

QA/QC – Quality Assurance/Quality Control

QC – Quality Control

QLs – Quantitation Limits

RPD – Relative Percent Difference

RSD – Relative Standard Deviation

SAP – Sampling and Analysis Plan

SOPs – Standard Operating Procedures

SRP – Site Remediation Program

SVOCs – Semivolatile Organic Compounds

TACO – Tiered Approach to Corrective Action

TPH – Total Petroleum Hydrocarbons

U.S. EPA – United States Environmental Protection Agency

USTs – Underground Storage Tanks

VOCs – Volatile Organic Compounds

1.0 PROJECT MANAGEMENT

The purpose of this document is to describe the personnel, procedures, and methods for ensuring the quality, accuracy, and precision of data associated with the City of Blue Island TOD Areas Redevelopment Brownfield Assessment Project. The City of Blue Island TOD Areas Redevelopment Brownfield Assessment Project received a $200,000 U.S. Environmental Protection Agency (U.S. EPA) Hazardous Substance Grant. The purpose of this grant is to assess properties potentially impacted by 'hazardous substances'. Following the procedures outlined in this Quality Assurance Project Plan (QAPP) will ensure that the data collected meets the project objectives. This QAPP will be valid for up to 5 years, and it will be reviewed annually (from the date of approval) to insure that it is up to date. This annual review will be documented and sent to all recipients of the QAPP with any updated materials (current laboratory certificates, resumes for new key staff, etc.) to insert into the QAPP. If substantial changes are anticipated during the project period (new laboratories, additional analyses, new field methods, etc.), a call will be arranged with all parties that reviewed this QAPP to determine how to revise this document.

1.1 Project Organization and Responsibility

Figure 1 presents the organizational structure for the TOD Redevelopment Areas Brownfields Assessment Project. All lines of communication, management activities, and technical direction within this project team will follow this organization arrangement. Any directions or communications from the U.S. EPA will be given to the City of Blue Island Project Engineer. The Project Engineer will subsequently communicate directions to the AECOM Environment (AECOM) project manager. The U.S. EPA project manager will be notified of all proposed changes in personnel.

Responsibilities of key project personnel are outlined below.

U.S. EPA Project Manager

1. Direct, review, and approve QAPP and Sampling and Analysis Plans (SAPs).
2. Provide technical consultation services to the Project Engineer and AECOM project manager.
3. Review progress reports detailing work accomplished.
4. Review all final reports.

U.S. EPA Quality Assurance Reviewer

1. Review and approve the QAPP.
2. Assist in review of the SAPs.

City Project Engineer Mgr.

1. Direct project activities.
2. Prepare and submit progress reports detailing work accomplished, funds spent, and the project status.
3. Responsible for review of project deliverables, development of project planning, and the overview of project strategies.
4. Review site reports for consistency with objectives stated in work plans.
5. Provide final signature on all assessments.

AECOM Project Manager

1. Responsible for planning, coordinating, monitoring, and evaluating of project field activities.
2. Before sampling, meet with the Project Engineer, quality assurance (QA) manager, and field staff to discuss and establish sampling purposes, sampling methodology, number of samples, size of samples, sample preservation methods, chain-of-custody (COC) requirements, analyses required, and which samples will be duplicated in the field.
3. Resolve technical problems.
4. Meet with team members to discuss and review analytical results prior to completion of reports.
5. Responsible for environmental reports and documents.

AECOM Quality Assurance Manager

1. Oversee assessment activities to ensure that sampling methodology, sample preservation methods, and COC procedures are being followed.
2. Assist in any QA issues with field or laboratory questions, as needed.
3. Conducts Field Audits.
4. Maintain a record of samples submitted to the laboratory, the analyses being performed on each sample, the final analytical results, and data validation reports.

5. Prepares Data Assessment Report (DAR).
6. Annual review of QAPP.

AECOM Data Manager

1. Maintain a record of all samples collected and the sample identification information on each sample.
2. Manage data acquired from field assessments and laboratory analyses.
3. Assemble data into computer format.

AECOM Field Team Leader

1. Complete on-site Health and Safety Plan (HASP) for each property to be investigated.
2. Complete a SAP for each property to be investigated prior to any field activities.
3. Be responsible for oversight of field activities and ensure that procedures for the field activities related to the QAPP are executed and documented properly.
4. Submit data generated during field assessment to the data manager.
5. Procuring, coordinating and qualifying all subcontractors.

AECOM Field Technical Staff

1. Before sampling, meet with **AECOM** project manager to discuss and establish sampling purposes, sampling methodology, number of samples, size of samples, sample preservation methods, COC requirements, analyses required, and which samples will be duplicated in the field.
2. Be responsible for collection of equipment needed for property assessment work, which would include personal protective equipment (PPE), sampling equipment, sample containers and coolers, water-level meters, monitoring devices, and any other equipment deemed necessary.

3. Oversee drilling and soil boring work to ensure that proper procedures are followed during monitoring well installation and soil sample collection from borings.

4. Monitor hazardous conditions while conducting field operations.

5. Submit COC records and field paperwork to field team leader.

Environmental Monitoring and Technologies, Inc Analytical Testing Corporation (EMT) Project Manager

1. Responsible for samples submitted to EMT, including those released to a subcontracted laboratory.

2. Responsible for summarizing quality assurance/quality control (QA/QC) requirements for the project, including those samples analyzed by subcontracted laboratories.

3. Maintain laboratory schedule and ensure that technical requirements are understood by laboratory personnel.

4. Provide technical guidance to AECOM project manager.

5. Ensure accuracy of the laboratory data.

EMT QA Manager

1. Responsible for evaluating adherence to policies and ensuring that systems are in place to provide QA/QC as defined in the QAPP.
2. Initiate and oversee audits of corrective action procedures.
3. Perform data reviews.
4. Maintain documentation of training.

Ms. Deborah Orr will serve as the U.S. EPA project manager. The U.S. EPA QAPP reviewer will be Ms. Jan Pels. Ms. Jodi Prout is the TOD Redevelopment Areas Project Engineer for this project.

Mr. Bryant Williams will serve as the AECOM project manager. Ms. Sarah Monette will serve as the AECOM QA manager. The AECOM data manager and the AECOM field team leader will be Eric Slusser. The field technical staff includes Eric Slusser and Bryant Williams, although other supporting staff from AECOM may be assigned on an as-needed basis. Resumes for proposed AECOM personnel are included in Appendix A.

All AECOM site personnel will be trained as mandated by the Occupational Safety and Health Administration (OSHA) Act regulations (29 Code of Federal Regulations [CFR] 1910.120). Additionally, all site personnel will be properly trained in the procedures for collecting, labeling, packaging, and shipping of liquid and solid environmental samples. Persons conducting asbestos surveys will be certified by the Illinois Department of Public Health. The AECOM project manager will maintain personnel training records. Field personnel will be trained to use all monitoring devices and other equipment used in the field.

The laboratory selected for the majority of the analytical work required for this project is Environmental Monitoring and Technologies, Inc (EMT) located in Morton Grove, Illinois. EMT laboratories have been certified under the Illinois Voluntary Site Remediation Program (SRP), which is administered by the State of Illinois. EMT's TACO Certification number for their Morton Grove, Illinois laboratory is 100256. As a SRP-certified laboratory, EMT has undergone

performance evaluations administered by the State of Illinois for method accuracy and precision. These evaluations meet the standards required by U.S. EPA. Mr. Greg Denny is the EMT laboratory director. Ms. Arminta Priddy will serve as the EMT project manager and the QA Manager. She will be ultimately responsible for ensuring the quality of the laboratory data.

AECOM will subcontract with Arcos Environmental Services, Inc. (Arcos) to conduct asbestos inspections of several buildings selected by the City of Blue Island. Arcos is a certified Minority-owned Business Enterprise (MBE) and Disadvantaged Business Enterprise (DBE). For analysis of asbestos containing materials (ACM), EMSL Analytical Inc., (EMSL) Chicago, Illinois will do the analyses. They are NVLAP (National Voluntary Laboratory Accreditation Program) certified.

The drilling subcontractor has not yet been selected for this project. However, all on-site drilling personnel shall have completed the applicable OSHA training. Additionally, drilling personnel will be required to comply with all site safety regulations covered in the site-specific HASP, provided under separate cover to this QAPP.

In the event a geophysical survey is required, AECOM will subcontract with STS AECOM, located in Vernon Hills, Illinois to complete the geophysical survey using Electromagnetic (EM) profiling and Ground Penetrating Radar (GPR). The EM profiling will make two measurements. One, a soil electrical conductivity which profiles the subsurface terrain and two, a metal sensitive response which will identify any buried metal objects. The GPR will be used to fine tune the EM survey where anomalies exist. The GPR can provide the depth and shape of subsurface objects as well as relative soil type. All on-site geophysical survey personnel shall comply with all site specific HASP requirements. AECOM personnel will oversee and assist any geophysical survey conducted.

1.2 Facility History/Background Information

The City of Blue Island TOD Areas Redevelopment Brownfield Assessment Grant is a communitywide project, meaning that specific sites have not been identified for Phase II Property Assessments. Therefore, once the Brownfield sites have been identified for Phase II work, property-specific information will be provided with the SAPs.

1.3 Project Description and Schedule

The City of ~~Project Name~~ Blue Island's Brownfield Assessment Grants are communitywide grants. The City has a list of potential brownfield sites to be evaluated consisting of 'hazardous substance and/or petroleum' contamination, and will prioritize the sites based on access to the properties, potential environmental issues, and redevelopment potential. The sites with the highest priorities will have Phase I and Phase II ESAs conducted as described in the cooperative agreement to understand the extent of environmental problems on a property. Once the environmental assessments are completed, the City will pursue cleanup and redevelopment, which is not part of these grant projects.

The entire City is the targeted community. The potential sites that have been identified are primarily former automotive repair and sales facilities, or obsolete, abandoned or marginally used industrial sites.

The City of Blue Island has retained AECOM as their consultant to perform Phase I and Phase II ESAs. The Phase I and Phase II ESAs are designed to provide City of Blue Island and the U.S. EPA with data to facilitate potential redevelopment of each property investigated. These data will be used to determine whether there is a threat from potential contaminants, solutions for any remedial activities, and estimated costs for site redevelopment. The Phase I ESA is predominantly a fact-finding investigation. The Phase II ESAs may consist of one or more of the following tasks:

- Collection and analysis of soil samples
- Collection and analysis of sediment samples
- Collection and analysis of groundwater samples
- Collection and analysis of surface water samples
- Collection and analysis of ACM and LBP, potentially
- Installation of groundwater monitoring wells
- Aquifer testing and evaluation of aquifer characteristics
- Test pits or trenching

- Evaluation of geophysical survey results
- Evaluation of natural bioattenuation processes
- Evaluation of active remedial technologies.

Details of the property-specific sampling activities will be addressed in the individual SAPs. The findings of each Phase II will be presented in a Phase II ESA report, which is discussed in later sections of this QAPP.

AECOM estimates that it will take approximately 3 to 7 months to perform a Phase II for each property. In general, it will take 1 to 2 weeks to prepare a SAP and HASP, 3 to 10 weeks to perform fieldwork including laboratory analyses, 4 weeks to gather any additional necessary data, and 4 to 6 weeks to prepare a Phase II report. The time is dependent on field conditions and laboratory data requirements. Once all of the assessments are complete, the Phase II ESA report will be prepared.
Table 1 (located at the end of the QAPP) presents the estimated time frames for this project.

For the project schedule, please note that Phase I ESAs and Phase II ESAs may be conducted concurrently for different sites. The Phase I and Phase II work will not follow in succession. Based on an ongoing evaluation of City of Blue Island's Brownfield program and the priorities established by the City of Blue Island Brownfield Task Force, additional properties may have Phase I ESAs started while Phase II activities have already begun on other properties.

An Illinois Environmental Laboratory Accreditation Program (ELAP)-certified laboratory will be used to ensure overall analytical quality. EMT will be the primary laboratory used for lab analyses. Copies of their ELAP certificates are included in Appendix B.

1.4 Data Quality Objectives (DQOs)

DQOs are qualitative and quantitative statements that clearly state the objective of a proposed project, define the most appropriate type of data to collect, determine the appropriate conditions for data collection, and specify acceptable decision error limits that establish the quantity and quality of data needed for decision making. The DQOs are based on the use of the

data that will be generated. Different data uses may require different quantities of data and levels of quality.

1.4.1 Analytical Quality Objectives

Analytical quality objectives are used to ensure that the analysis will accurately and adequately identify the contaminants of concern, and to ensure that the analysis selected will be able to achieve the quantitation limits less than or equal to the target cleanup levels.

1.4.1.1 Field Screening

Field-screening instruments provide a lower quality of analytical data compared to laboratory equipment in a controlled environment. However, field methods provide rapid "real-time" results for field personnel in order to help guide field decision-making processes. These techniques are often used for health and safety monitoring, initial site characterization to locate areas for detailed assessment, and preliminary comparison of remedial objectives. This type of field-screening data can include measurements of pH, temperature, conductivity, turbidity, or similar monitoring data. Field measurements of pH, temperature, conductivity, and turbidity will be collected during groundwater and surface water sampling activities. During sampling and other property assessment activities, the breathing space of site personnel will be monitored for the presence of organic vapors using a photoionization detector (PID). The PID will also be used to perform field screening of soil and sediment samples in order to assist in the selection of samples to be submitted for laboratory analysis. Generally, the soil interval with the highest PID readings at a boring or sampling location will be submitted to the laboratory. If no volatile organic compounds (VOCs) are detected by the PID, samples will be selected for laboratory analysis based on the following:

- Obvious discoloration, odor, or other visible signs of contamination.
- If no visible or odorous signs of contamination are evident, a sample from the zone directly above the water table will be submitted.
- A sample from a depth corresponding to the zone in the subsurface expected to contain the greatest concentration of contaminants will be submitted. This

selection will be based on the type of release and the history of the area being investigated and will be determined by the AECOM project manager.

1.4.1.2 IEPA SRP Analyses

The City of Blue Island may wish to obtain a Covenant Not to Sue (CNS) from the Illinois Governor's office once a Certificate of Completion has been issued by IEPA through the SRP. Therefore, all laboratory analyses will be conducted under SRP DQO protocol.

EMT, an IL – ELAP certified laboratory, will be the primary laboratory for this project. As discussed in Section 1.1, an IL – ELAP -certified laboratory is one that has undergone performance evaluations performed by an IEPA accredited authority, in this case the State of Illinois, for method accuracy and precision, and meets the requirements set forth by the U.S. EPA. All analyses e.g., volatile organic compounds (VOCs), Polynuclear aromatic compounds (PNAs) and inorganic RCRA metals analyses, will be performed by EMT at their Morton Grove laboratory. Copies of the EMT's NELAC certificates are included in Appendix B. Table 2 summarizes the analyses performed by EMT.

1.4.2 Project Quality Objectives

The project quality objectives process is a series of planning steps designed to ensure that the type, quantity, and quality of environmental data used in decision making are appropriate for the intended application. There are five steps in the project quality objectives process that include problem statement, decision identification, decision inputs, assessment boundary, and the decision process. The details of these steps are provided in the following sections.

1.4.2.1 Problem Statement

City of Blue Island intends to use the U.S. EPA Brownfields Assessment Grant funds to investigate properties listed for redevelopment, and possibly several others as identified by members of the community. Based on the prioritization, the balance of the funds will be used to conduct Phase I and Phase II ESAs. The intention of the Phase Is will be to identify environmental conditions that may cause threats to redevelopment. The property-specific work

plans will detail the proposed methods for identifying contaminants, assessing the hazards posed by these contaminants, and managing or remediating contaminants for property redevelopment.

Exposure assessments and proposed redevelopment use of each of the properties are discussed in the property-specific SAPs.

1.4.2.2 Decision Identification

Available information will be used to determine if the subject properties have been contaminated. To assess the feasibility of property redevelopment, City of Blue Island will ask the following questions:

- Do contaminant levels exceed applicable standards such as TACO Tier 1 Residential Soil Remediation Objective limits?
- Can the contaminants be managed by eliminating exposure pathways through engineering and institutional controls?
- Will the property require remediation prior to redevelopment?
- If remediation is too costly based on the expected land use, can the property be developed for another use?

1.4.2.3 Decision Inputs

Samples of soil, sediment, groundwater and/or surface water will be collected for analysis as described in the SAPs in order to assess the level of contamination. Samples will be collected to either assess the data gaps identified from work previously completed or assess Recognized Environmental Conditions (RECs) noted during the Phase Is. An REC is the presence or likely presence of any 'hazardous substance and/or petroleum's or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any 'hazardous substance and/or petroleum's or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property or nearby properties. Such data gaps or environmental conditions may answer the following:

- What is the level of potential exposure to surface or subsurface soils at the property?
- What is the level of potential exposure to surface water and associated sediments at the property?
- What is the level of potential exposure to groundwater at the property?
- Have past uses of the property (or adjacent properties) impacted the soil, sediment, surface water, or groundwater?
- Did past 'hazardous substance and/or petroleum' handling or storage activities, if any, impact the property?
- If any former underground storage tanks (USTs) existed on the property, does contamination exist near the area of the identified tank?
- Have former aboveground storage tanks (ASTs) impacted the surrounding media at the property?
- Does fill material (such as slag) used at the property contain contaminants that may impact soil, sediment, surface water, or groundwater?
- Has uncontrolled dumping or landfilling activities occurred at the property, and if so, have they impacted the soil, sediment, surface water, or groundwater?

1.4.2.4 Assessment Boundary

A site map showing the assessment boundary will be provided in each SAP. Because target properties will be selected based on the results of Phase Is and the nature of environmental impacts will be property-specific, detailed information regarding the assessment boundaries cannot be determined currently. However, once the target properties are identified, information regarding the assessment boundaries will be included in the associated SAPs. The assessment boundary information in each SAP will include the property boundaries, potential exposure areas, and sample locations and depths. It should be noted that the assessment boundary will not necessarily be the property boundary.

The vertical assessment boundary will vary depending on the end use of the subject property. Under Illinois SRP, vertical points of compliance differ for residential and commercial/industrial uses.

1.4.2.5 City of Blue Island Decision Process

Illinois EPA's TACO generic numerical standards may be the applicable State standards for cleanup criteria. Soils and sediment will be compared to the applicable Tier 1 Industrial/Commercial soil land use standards presented in (35 IAC Section 742. Appendix B Table B Tier 1 Soil Remediation Objectives for Industrial/Commercial Properties). Groundwater results will be compared with the TACO Tier 1 Groundwater Remediation Objectives (35 IAC Section 742. Appendix B Table E Tier 1 Groundwater Remediation Objectives for the Groundwater Component of the Groundwater Ingestion Route). If sample results collected as part of the property assessment are all below the applicable TACO Tier 1 standards (35 IAC Section 742), then the redevelopment project will proceed as planned.

If sample results exceed the applicable land-use specific TACO standards, City of Blue Island will consider the following options:

- If contaminant levels exceed the TACO Tier 1 Industrial/Commercial criteria, then City of Blue Island may opt to resample the specific locations associated with elevated contaminant levels. If any of the resample results confirm the original data, City of Blue Island will consider the second option listed below. If all the resample results are below the TACO Tier 1 Residential limits, no further remedial action will be pursued at the property.
- If soil or groundwater contaminant levels exceeding TACO Tier 1 Industrial/Commercial standards are associated only with a specific exposure pathway, City of Blue Island may then conduct a property-specific risk assessment and pursue an exclusion of exposure pathways through the use of engineering and institutional controls. These controls may be implemented through an Operation and Maintenance (O&M) Agreement with SRP.
- If an exposure pathway cannot be eliminated through engineering or institutional controls, then Project Name may develop a Remedial Action Plan to meet the needs of the proposed future use of the property.

1.5 Quality Assurance Objectives for Measurement

The overall QA objective for each project is to develop and implement procedures for field sampling, COC, laboratory analysis, and reporting using SRP protocol. Specific procedures for sampling, COC, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, audits, preventative maintenance of field equipment, and corrective action are described in other sections of this QAPP.

Data quality objectives for measurements during this project will be addressed in terms of precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS). The numerical PARCCS parameters will be determined from the project DQOs to ensure that they are met. The DQOs and resulting PARCCS parameters will require that the sampling be performed using standard methods with properly operated and calibrated equipment, and conducted by trained personnel.

1.5.1 Precision

Precision is the degree of agreement among repeated measurements of the same parameter under the same or similar conditions. Precision is reported as either relative percent difference (RPD) or relative standard deviation (RSD), depending on the end use of the data.

1.5.1.1 Field Precision Objectives

Field precision will be assessed through the collection and analysis of field duplicate samples. RPDs will be calculated for the detected analytes from investigative and field duplicate samples. Water matrix samples can be readily duplicated due to their homogeneous nature; conversely, the duplication of soil or sediment samples is much more difficult due to their non-homogeneous nature. Due to this difficulty, RPDs of ±35 percent and ±50 percent for water and soil sample field duplicates, respectively, will be used as advisory limits for analytes detected in both investigative and field duplicate samples at concentrations greater then or equal to five times its quantitation limit. A summary of duplicate samples to be collected is presented in Table 3 (presented at the end of the QAPP), along with the other quality control samples. Per the Illinois

SRP, field duplicate samples must be provided for each matrix (soil, groundwater, etc.) sampled. The minimum number of field duplicate samples required for each round of sampling is one for every 20 samples. If there are fewer than 20 samples per matrix, one field duplicate per matrix will be submitted.

Field sampling for asbestos containing materials (ACM) will follow Asbestos Hazard Emergency Response Act (AHERA) sampling protocols. Asbestos sampling procedures are documented in AECOM's SOP for bulk asbestos sampling included in Appendix E of this QAPP.

1.5.1.2 Laboratory Precision Objectives

For EMT, precision of laboratory analyses will be based upon laboratory matrix spike/matrix spike duplicate (MS/MSD) analyses. Precision is reported as RPD or RSD, and the equation to be used to determine precision is presented in Section 4.3.1. MS/MSD analyses will be either at a rate of 1 per 20 samples received by the laboratory or in accordance with laboratory Standard Operating Procedures (SOPs). Table 2 lists the MSD and RPDs used by EMT.

For EMSL, analyst and laboratory accuracy is assessed by re-analysis of known reference and proficiency test samples. Those samples containing any asbestos are subjected to a statistical analysis wherein the analyst and laboratory bias is assessed and the accuracy of the analysis is entered into control charts for the individual analyst and for the laboratory as a whole. A similar analysis is performed on the comparative data between visual estimates of asbestos content and point count determinations.

1.5.2 Accuracy

Accuracy is the extent of agreement between an observed or measured value and the accepted reference, or true, value of the parameter being measured.

1.5.2.1 Field Accuracy Objectives

The objective for accuracy of the field sample collection procedures will be to ensure that samples are not affected by sources external to the sample, such as sample contamination by ambient conditions or inadequate equipment decontamination procedures. Sampling accuracy will be assessed by evaluating the results of equipment and trip blank samples for contamination.

A trip blank will consist of a laboratory-prepared sample of reagent-grade water. Trip blanks will accompany sample containers and be subjected to the same handling procedures as the field samples, but will not be opened and will be shipped back to the laboratory with the samples. Trip blanks are required only when VOCs will be analyzed. Trip blanks will be submitted at the rate of one trip blank per shipping container containing field samples for laboratory VOC analysis. The trip blank samples will provide a measure of potential cross contamination of samples by VOCs during shipment and handling.

Equipment blanks will be collected by pouring laboratory-prepared water or distilled water over or through the field sampling equipment and collecting the rinsate in the proper analytical containers. Equipment blanks must be submitted to the laboratory with investigative samples and analyzed for the same parameters as the investigative samples. The minimum required under the U.S. EPA is one per 20 field samples per matrix or, if less than 20 samples are collected, one equipment blank per day per sample matrix.

Trip and equipment blanks will be analyzed during assessment activities in order to assess potential problems as they occur.

1.5.2.2 Laboratory Accuracy Objectives

EMT's accuracy will be assessed by determining percent recoveries from the analysis of laboratory control samples (LCSs) or standard reference materials (SRMs). The analyses of MS/MSD samples are also utilized to determine laboratory accuracy by determining percent recoveries from the analysis of MS/MSD samples. MS/MSD samples will be collected for organic and inorganic analyses at a minimum frequency of 1 per 20 or fewer samples. The equation used to determine accuracy for this project is presented in Section 4.3.2.3.

The accuracy of the organics analyses also will be monitored through analysis of surrogate compounds. Surrogate compounds are added to each sample, standard, blank, and QC sample prior to sample preparation and analysis. Surrogate compounds are not expected to be found occurring naturally in the samples, but behave analytically similar to the compounds of interest. Consequently, surrogate compound percent recoveries will provide information on the effect that the sample matrix exhibits on the accuracy of the analyses.

In addition, please see Section 5.0 of the EMT's QA Manual, located in Appendix C of this QAPP, for the laboratory's QA objectives.

1.5.3 Representativeness

Representativeness is a qualitative term that describes the extent to which a sampling design adequately reflects the environmental conditions of the site. It also reflects the ability of the sample team to collect samples and laboratory personnel to analyze those samples in such manners that the data generated accurately and precisely reflect the conditions at the site.

1.5.3.1 Measures to Ensure Representativeness of Field Data

Representativeness will be achieved by establishing the level of allowable uncertainty in the data and then statistically determining the number of samples needed to characterize the population through the DQO process. It will also be achieved by ensuring that sampling locations are properly selected. Representativeness is dependent upon the proper design of the sampling program and will be accomplished by ensuring that this QAPP, the property-specific SAPs, and standard procedures are followed. The QA goal will be to have all samples and measurements representative of the media sampled. Field testing for pH, temperature, and specific conductivity stabilization prior to groundwater sampling will ensure that representative samples are collected. Soil intervals will be homogenized for all analyses except VOCs to help ensure that representative soil samples are collected. Suspected ACM and lead based paint samples will be collected to ensure enough material is collected to accurately represent the bulk sample.

1.5.3.2 Measures to Ensure Representativeness of Laboratory Data

Representativeness of laboratory data cannot be quantified. However, adherence to the prescribed analytical methods and procedures, including holding times, blanks, and duplicates, will ensure that the laboratory data is representative.

1.5.4 Completeness

Completeness is defined as the measure of the quantity of valid data obtained from a measurement system compared to the quantity that was expected under normal conditions. While a completeness goal of 100 percent is desirable, an overall completeness goal of 90 percent may be realistically achieved under normal field sampling and laboratory analysis conditions.

1.5.4.1 Field Completeness Objectives

The field-sampling team will take measures to have data generated in the field be valid data. However, some samples may be lost or broken during handling and transit. Therefore, field completeness goals for this project will be to have 90 percent of all samples be valid data. The equation for calculating completeness is presented in Section 4.3.5.1.

1.5.4.2 Laboratory Completeness Objectives

Laboratory completeness will be a measure of the quantity of valid data measurements and analyses obtained from all the measurements and analyses completed for the project. The laboratory completeness goal is for 90 percent of the samples analyzed to be valid data. The procedure for determining laboratory data validity is provided in Section 4.2.2. The equation for calculating completeness is presented in Section 4.3.5.1.

1.5.5 Comparability

The confidence with which one data set can be compared to another is a measure of comparability. The ability to compare data sets is particularly critical when a set of data for a specific parameter is compared to historical data for determining trends.

1.5.5.1 Measures to Ensure Comparability of Field Data

Ensuring that this QAPP and the property-specific SAPs are adhered to and that all samples are properly handled and analyzed will satisfy the comparability of field data. Additionally, efforts will be made to have sampling completed in a consistent manner by the same sampling team.

1.5.5.2 Measures to Ensure Comparability of Laboratory Data

Analytical data are comparable when the data are collected and preserved in the same manner followed by analysis with the same standard method and reporting limits. Data comparability is limited to data from the same environmental media. Analytical method quality specifications have been established to help ensure that the data will produce comparable results. Table 2 summarizes the laboratory reporting limits.

1.5.6 Sensitivity

Sensitivity is the ability of a method or instrument to detect a parameter to be measured at a level of interest.

1.5.6.1 Measures to Ensure Field Sensitivity

The sensitivity of the field instruments selected to measure temperature, conductivity, turbidity, and the dissolved oxygen (DO) of groundwater for this project will be measured by analyzing calibration check solutions, where appropriate, that equate to the lower end of the expected concentration range. The sensitivity of the photoionization detector (PID) used to screen samples for organic vapors are relative to background readings in ambient air.

1.5.6.2 Measures to Ensure Laboratory Sensitivity

The sensitivity requirements for laboratory analyses are to be such to an extent as to meet SRP standards for both soil and groundwater, Illinois EPA ACM standard of *1%*, and the U.S Department of Housing and Urban Development (HUD) standard for lead-based paint of 0.5 percent by weight. If analytical methods are deemed to be insufficiently sensitive, alternative analytical methods may be utilized. Additionally, minimum laboratory detection limits which exceed TACO standards will be evaluated in the following manner:

- Is the compound expected to be a chemical of concern, or, if the reporting limit exceeds TACO Tier 1 Industrial/Commercial groundwater standards, was the

compound detected in the surrounding soils? If the compound is not an expected COC or detected in the soils, then the compound will be considered nondetect. If the compound is considered a COC or was detected in the surrounding soils, the compound will be evaluated in a human health risk assessment using half the detection limit.

- If the reported detection limit exceeds TACO Tier 1 Industrial/Commercial groundwater standards, does the compound have an established Federal maximum contaminant level (MCL), and if so, does the reporting limit meet the MCL. If the reporting limit meets the MCL, the compound will be considered nondetect. If the reporting limit exceeds the MCL, the compound will be evaluated as part of a human health risk assessment using half the reported laboratory detection limit.

Table 2 presents the laboratory reporting limits.

1.6 Documentation and Records

Records generated during Phase II activities are a critical part of any property assessment. AECOM will use select documents for recording information during project activities. Records to be used for project documentation include field forms, field books, laboratory data sheets, COC forms, and technical papers. City of Blue Island will retain the records generated during assessment activities for a minimum of 10 years following the completion of this project. At that time, the ***City of Blue Island*** will be contacted prior to disposal of these records.

At a minimum, the draft and final Phase II Site Assessment report submittal packages will include the following:

- Text describing field-sampling methodologies, analytical results, conclusions, and recommendations.
- Figures showing property location, property boundaries, sampling locations, and summaries of impacted areas.
- Tables comparing all laboratory data to the applicable standards.
- Tables summarizing QA/QC analytical results.

- Complete laboratory data reports, including copies of all COC records.
- Copies of soil boring, groundwater, sediment, and surface water sampling logs.
- Other relevant material needed to support property redevelopment.
- Data Assessment Report that discusses and compares overall field duplicate precision data from multiple data sets collected for the project for each matrix, analytical parameter, and concentration level.

2.0 DATA GENERATION AND ACQUISITION

The purpose of the QAPP is to produce reliable data that will be generated throughout the assessment by:

- Ensuring the validity and integrity of the data;
- Ensuring and providing mechanisms for ongoing control of data quality;
- Evaluating data quality in terms of PARCCS; and
- Providing usable, quantitative data for analysis, interpretation, and decision making.

2.1 Sampling Process Design

Sample locations, analytical parameters, and frequency of sampling are discussed in the property-specific SAPs. Laboratory test parameters for the sampling program will include analysis for one or more of the following parameters:

- VOCs (Method 8260)
- SVOCs (Method 8270)
- PAHs (Method 8310 or 8270 SIM)
- Total metals (Methods 6010 or 6020), including mercury (Methods 7470 and 7471) and hexavalent chromium (Method 7196A)
- Pesticides (Method 8081)
- Herbicides (Method 8151)
- PCBs (Method 8082)

- Cyanide (Methods 9010C and 9012B)
- Lead-based paint (Method 6010 or 7420)
- Asbestos (EPA Method 7400)

The laboratory SOPs for these analytical parameters are presented in Appendix C.

Analytical parameters will be chosen based on representative contaminants most commonly associated with the former activities and/or identified areas (IAs) at each property.

Sampling will occur as a stepwise process. During initial sampling activities, it is expected that a variety of chemicals of concern will be analyzed. The initial results may indicate that only certain chemicals of concern are present. Therefore, later rounds of sampling will include only those specific compounds or class of compounds present in the initial sampling events.

QA/QC samples will be submitted in accordance with the QAPP protocols presented in the following sections. Requirements for QA/QC samples are presented in Table 3.

2.2 Analytical Methods Requirements

In order to preserve the integrity of samples both before and during analyses, specific analytical methods and requirements for those methods will be followed. Samples will be collected, prepared, and analyzed in accordance with the analytical methods outlined in EMT's SOPs (Appendix C). EMT will coordinate all analytical services for this assessment. The specific analytical method and reporting limits for each parameter are presented in Table 2. Preparatory methods for analytical parameters are discussed in the laboratory SOPs included in Appendix C.

Proper sample containers, preservation, holding times, and volumes for each analytical parameter are outlined in Table 4 (presented at the end of the QAPP). EMT will provide all sample containers and preservatives for this project. Sample containers for groundwater VOC analysis will be pre-preserved with acid by the laboratory. Metals will be preserved in the field using pre-measured acid vials, and pH paper will be used to verify that pH is <2 for the preserved samples.

In addition, sample containers for groundwater cyanide analysis will be pre-preserved with NaOH, and pH paper will be used to verify that pH is >12 for the preserved samples. Soil containers for VOCs will be pre-preserved with methanol (10mLs for 10g soil).

All sample containers supplied by EMT will be cleaned according to U.S. EPA standards. QC documentation will be supplied with the sample containers and preservatives in order to verify their purity. The containers and preservatives can be traced back to their certificate of analysis from their lot number. The QC documentation/certificate of analysis shall be maintained on file with EMT. Additionally, EMT shall provide the field team with trip blanks for VOC analysis and laboratory-grade deionized (DI) water for rinsing field equipment and instruments.

2.3 Sample Handling and Custody Requirements

Proper sample handling and custody procedures are crucial to ensuring the quality and validity of data obtained through field and laboratory analyses. For example, the admissibility of environmental data as evidence in a court of law is dependent on the custody of the data. Custody procedure will be used to document the authenticity of data collected during the City of Blue Island Brownfield Assessment Project. The data requiring custody procedures include field samples and data files that can include field books, logs, and laboratory reports. An item is considered in custody if it is:

- In a person's possession;
- In view of the person after being in their possession;
- Sealed in a manner that it can not be tampered with after having been in physical possession; or
- In a secure area restricted to authorized personnel.

2.3.1 Sample Collection Documentation

Sample-handling procedures include field documentation, COC documentation, sample shipment, and laboratory sample tracking. Various aspects of sample handling and shipment, as well as the proposed sample identification system and documentation, are discussed in the following sections.

2.3.1.1 Field Books

Detailed records of the field activities will be maintained in field books dedicated to the City of Blue Island Brownfield Assessment Project. Entries will be dated and signed by personnel recording the data. The entries will be made in ink. Each field book will have a unique numerical identifier permanently attached, and each page will be numbered, permitting indexing of key data. At a minimum, information recorded in the field books will include documentation of sample locations, sampling times, types of samples collected, weather conditions, and any other information pertinent to the assessment.

2.3.1.2 Field Identification System

Each sample collected during property assessments will be given a unique identification code. Each unique sample identification will consist of the following:

- *Project Identification Code.* A two-letter designation will be used to identify the property from which the sample was collected. Examples of this include the following:

  SG – Smitty's Gas Station
  BF – Bulk facility

- *Sample Matrix Code.* Each sample will be further identified by a code corresponding to the sample matrix:

  GW – groundwater sample
  SW – surface water sample

SD – sediment sample

SS – surface soil sample

SB – subsurface soil sample

TB – trip blank sample

EB –equipment blank sample

FD – field duplicate sample.

- *Location Code.* Lastly, each sample will be identified by a location code and interval as follows (note that surface water, sediment, and surface soil samples will be numbered consecutively and not given an additional location identifier):

  MW-## - monitoring well location

  GP-## - location of Geoprobe® or other direct-push boring

  B-## - location of borings completed by methods other than direct-push.

- *Examples.*

  SG-GW-MW-01 = groundwater sample from Monitoring Well 1 Smitty's Gas Station property

  SG-GW-MW-01-FD = duplicate groundwater from MW 1

Sample bottle labels appropriate for the size and type of containers shall be provided by EMT. The sample containers will be labeled at the time of sample collection but prior to being filled. Each label will indicate at a minimum:

- Sample identification
- Date/time of sample collection
- Sampler's initials
- Required analyses
- Type of preservative.

All labels will be completed in waterproof ink. An example of a sample label is included in Appendix D.

2.3.1.3 Field Sample Handling

The possession and handling of samples will be documented from the time of collection to delivery to the laboratory. AECOM field personnel are responsible for ensuring that COC procedures are followed. Field personnel will maintain custody of all samples until they are relinquished to another custodian, the laboratory, or to the freight shipper.

All samples must be catalogued on a COC form using sample identification codes. A copy of the COC form is included in Appendix D. The date and time of collection will be recorded on the form, as well as the number of each type of sample, the method of preservation, and the type of analysis. The COC SOP is located in Appendix E.

2.3.1.4 Field Sample Packaging and Shipping

Samples will be packaged and transported in a manner that maintains the integrity of the sample and permits the analysis to be performed within the prescribed holding time. Prior to shipment, each sample container will be inspected for a label with the proper sample identification code.

Samples will be either couriered or shipped via overnight mail to EMT in Morton Grove, IL. The laboratory will be contacted in advance to expect shipment so that holding times of the samples will be conserved. The COC forms will be sealed in a plastic bag and transported inside the sample cooler. In addition, any shipping receipts will be incorporated into the COC documentation. Samples will be packed in the cooler using bubble-wrap packing materials and ice will be sealed in a Ziploc®-type bag. Any samples suspected of being highly contaminated will additionally be sealed in a Ziploc®-type bag. The cooler will be taped closed using custody seals provided by EMT to prevent tampering during transport. Upon relinquishing the sample cooler to EMT, AECOM field personnel will sign custody of the samples over to the laboratory by signing and dating the bottom of the COC form. One copy of the COC documentation will be

retained by the AECOM data manager and a second copy will be retained by the laboratory. The integrity of the custody seals shall be noted by EMT on the COC form upon arrival. In addition, the shipping label will be included with the COC form retained by the AECOM data manager.

2.3.1.5 Field Documentation

Field COC procedures will ensure the proper documentation of each sample from collection in the field to delivery at the laboratory. Custody of samples shall be maintained and documented at all times. The documentation for each sample will include the following information:

- COC form
- Sample label with sample identification code
- Shipping documents.

This documentation will allow for proper identification and verification of all samples upon arrival at EMT.

2.3.2 Laboratory Chain of Custody

EMT will perform laboratory custody procedures for sample receiving and log-in, sample storage, tracking during sample preparation and analysis, and storage of data in accordance with their SOPs. The EMT project manager will be responsible for ensuring that laboratory custody protocol is maintained. The laboratory's SOP for sample custody is presented in Section 7.0 of the Laboratory QA Manual (Appendix C).

2.3.3 Final Evidence Files Custody Procedure

AECOM will be responsible for the custody of the evidence files and maintain and update the contents of the files during the project. The evidence files will include all records relevant to sampling and analysis activities such as boring logs, field books, photographs, subcontractor

reports, laboratory data deliverables, COC forms, and data reviews. AECOM will retain this file for a period of 10 years after completion of the assessment.

2.4 Quality Control Requirements

The quality control requirements ensure that the environmental data collected is of the highest standard feasible as appropriate for the intended application. Facets of the quality control requirements are provided in the following sections.

2.4.1 Field Quality Control Requirements

Where applicable, QC checks will be strictly followed during the assessment through the use of replicate measurements, equipment calibration checks, and data verification by AECOM field personnel. Field-sampling precision and data quality will be evaluated through the use of sample duplicates, equipment blanks, and trip blanks. Sample duplicates provide precision information regarding homogeneity, handling, transportation, storage, and analysis. Equipment blanks will be used to ensure that proper decontamination procedures have been performed and that no cross contamination has occurred during sampling or transportation. Trip blanks will be used with VOCs only, to ensure that transportation of samples has not contaminated the samples. If there is any discrepancy in the sample data, the AECOM project manager will be notified and, if deemed necessary, resampling of the questionable point scheduled. Requirements for field QA/QC samples are listed in Table 4. QA/QC sample quantities are also identified in the property-specific SAPs.

2.4.2 Laboratory QC Requirements

The laboratory QA manager will be responsible for ensuring that the laboratory's data precision and accuracy are maintained in accordance with specifications. Internal laboratory duplicates and calibration checks are performed on one of every 20 samples submitted for analysis. Other internal laboratory QA/QC is performed according to laboratory SOP. Soil and water samples that are submitted for laboratory MS/MSD or spike and duplicate analyses will have an additional set of samples collected from the sample locations. In the case of VOCs,

double the amount will be collected. Typically laboratories require two to three sample containers for each sample location, therefore, four to six sample containers will be collected for laboratory MS/MSD analyses (i.e., six TerraCore® or EnCore® sample tubes will be collected). If soil VOCs are preserved in the field with methanol, additional sample volume is not required for the MS/MSD analyses. For water analyses of SVOCs, Pesticides/PCBs/Herbicides, the laboratory requirements will be confirmed and noted here since these analyses typically require at a minimum double and up to triple the amount of water for the MS/MSD analyses.

2.5 Instrument Calibration and Frequency

The calibration procedures to be employed for both the field and laboratory instruments used during the City of Blue Island Brownfield Assessment Project are referenced in this section. Measuring and test equipment used in the field and laboratory will be subjected to a formal calibration program. The program will require equipment of the proper type, range, accuracy, and precision to provide data compatible with the specified requirements and the desired results. Calibration of measuring and test equipment may be performed internally using in-house reference standards, or externally by agencies or manufacturers.

The responsibility for the calibration of laboratory equipment rests with EMT. AECOM field personnel are responsible for the calibration of AECOM field equipment and field equipment provided by subcontractors.

Documented and approved procedures will be used for calibrating measuring and testing equipment. Widely accepted procedures, such as those published by U.S. EPA and American Society for Testing and Materials (ASTM), or procedures provided by manufacturers in equipment manuals will be adopted.

Calibrated equipment will be uniquely identified by the manufacturer's serial number, an AECOM equipment identification number, or by other means. This identification, along with a label indicating when the next calibration is due (only for equipment not requiring daily calibration), will be attached to the equipment. If this is not possible, records traceable to the equipment will be readily available for reference. It will be the responsibility of all equipment

operators to check the calibration status from the due date labels or records prior to using the equipment.

Measuring and testing equipment will be calibrated at prescribed intervals and/or as part of operational use. Frequency will be based on the type of equipment, inherent stability, manufacturer's recommendations, values given in national standards, intended use, and experience. Equipment will be calibrated whenever possible using reference standards having known relationships to nationally recognized standards or accepted values of physical constants. If national standards do not exist, the basis for calibration will be documented.

Physical and chemical reference standards will be used only for calibration. Equipment that fails calibration or becomes inoperable during use will be removed from service, segregated to prevent inadvertent use, and tagged to indicate the fault. Such equipment will be recalibrated and repaired to the satisfaction of the laboratory personnel or AECOM field personnel, as applicable. Equipment that cannot be repaired will be replaced.

Records will be prepared and maintained for each piece of calibrated measuring and test equipment to document that established calibration procedures have been followed. Records for subcontractor field equipment and AECOM equipment used only for this specific project will be kept in the project files. EMT will maintain laboratory calibration records.

2.5.1 Field Instrument Calibration

Instruments used to gather, generate, or measure field environmental data will be calibrated with sufficient frequency and in such manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. Field measurement instruments will include PID units used to detect VOCs, pH meters, conductivity meters, and temperature probes. As applicable, field instruments will be calibrated daily prior to use. The calibration will be consistent with the standard procedure. The field calibration procedures are presented in the field SOPs located in Appendix E.

Calibration procedures will be documented in the field logbook and field sampling sheets. Documentation will include the following:

- Date and time of calibration
- Identity of the person performing the calibration
- Reference standard used, if applicable
- Reading taken and adjustments to attain proper reading
- Any corrective action.0

Trained personnel will operate field measurement equipment in accordance with the appropriate standard procedures or manufacturer's specifications. AECOM field technical staff members will examine field measurement equipment used during field sampling to verify that they are in operating condition. The AECOM field team leader will periodically audit the calibration and field performance of the field equipment to ensure that the system of field calibration meets the manufacturer's specifications.

2.5.2 Laboratory Instrument Calibration

The proper calibration of laboratory equipment is a key element in the quality of the analysis done by the laboratory. Each type of instrumentation and each U.S. EPA-approved method have specific requirements for the calibration procedures, depending on the analytes of interest and the sample medium.

The calibration procedures and frequencies of the equipment used to perform the analyses will be in accordance with requirements established by the U.S. EPA. The laboratory QA manager will be responsible for ensuring that the laboratory instrumentation is maintained in accordance with specifications. Individual laboratory SOPs will be followed for corrective actions and preventative maintenance frequencies. Laboratory quality control, calibration procedures, and corrective action procedures are discussed in Sections 5.0 and 11.0, 9.0, and 13.0, respectively, of the EMT QA Manual. Instrument preventative maintenance is discussed in Section 10. EMT's QA Manual is located in Appendix C.

2.6 Data Management

AECOM field technical staff members will manage raw data during field activities. Data such as geologic profiles, pH readings, and pump test results will be recorded on the appropriate

field forms (examples of which are located in Appendix D) or in field logbooks. The AECOM data manager will periodically collect data gathered during assessment activities in order to maintain results. As appropriate, the AECOM data manager will coordinate transfer of raw data to computer formats such as Microsoft® Excel or Microsoft® Access to better organize and track incoming data. This will enable the AECOM data manager to identify any data gaps. Any flaws in field QA/QC will be brought to the attention of the AECOM QA manager.

The EMT project manager will be responsible for laboratory data management. EMT procedures for data review and data reporting are discussed in Section 12.0 of EMT QA Manual, located in Appendix C. Analytical data reports generated by EMT will present all sample results, including all QA/QC samples. Soil results will be reported on a dry weight basis. All data, including QA/QC results, will become part of the project files and will be maintained by the AECOM data manager. Upon report delivery, AECOM personnel will analyze laboratory data in accordance with accepted statistical methodologies and will be supervised by the AECOM data manager.

3.0 ASSESSMENT/OVERSIGHT

Performance and system audits will be completed to ensure that the field sampling activities and laboratory analyses are performed following the procedures established in this QAPP, including the attached SOPs, and the property-specific SAPs. The audits may be both internally and externally led, as further described below.

3.1 Technical Systems Audits

Generally, system audits are a qualitative measure of adherence to sampling QA measures overall, including sample collection handling, decontamination procedures, COC, and recording requirements in the field, as well as sample receiving, log-in, and instrument operating records in the laboratory.

3.1.1 Field Data

An AECOM geologist will be present at the site during sampling activities. The geologist will provide the on-site supervision required during the project. The geologist will be in daily contact with the AECOM field team leader, who will then review compliance with the project objectives and sampling protocol outlined in this QAPP. Any anticipated modifications to the sampling or measuring procedures will be reported to the Project Engineer and U.S. EPA project manager. AECOM field technical staff members will report modifications to the AECOM project manager, and document the modification in the field logbook.

Sample data precision will be determined by the collection and subsequent analysis of sample duplicates, equipment blanks, and trip blanks to verify reproducibility.

3.1.2 Field Screening Instruments

AECOM field technical staff members will audit and maintain the performance field-screening instruments.

3.1.3 Report Preparation

Prior to submittal to City of Blue Island and U.S. EPA, all reports will undergo a peer review conducted by a project team within AECOM. All components of the report will be checked and initialed by a designated team member. City of Blue Island will also review all reports prior to submittal to U.S. EPA.

3.1.4 Laboratory Data

Laboratory results will be reviewed for compliance against the DQO criteria for the level of reporting required.

3.2 Performance Evaluation Audits

Generally, performance audits are a quantitative measure of field sample collection and laboratory analyses quality.

3.2.1 Field Audits

The AECOM QA manager will conduct audits of field activities. U.S. EPA may also conduct an independent field audit. At least one field audit will be completed near the beginning of the sample collection activities for each assessment. If a second phase of field activities is necessary and the second phase starts more than 6 months following the initial phase, then a second field audit will be completed. The field audit will include the following checklist:

Item	Description of Field Audit Activities	QA Manager Initials
1.	Review of field-sampling records	
2.	Review of field-measurement procedures	
3.	Examination of the application of sample identifications following the specified protocol	
4.	Review of field instrument calibration records and procedures	

5.	Recalibration of field instruments to verify calibration to the manufacturer's specifications	
6.	Review of the sample handling and packaging procedures	
7.	Review of COC procedures	

If deficiencies are observed during the audit, the deficiency shall be noted in writing and a follow-up audit may be completed if deemed necessary by the project QA manager. Corrective action procedures may need to be implemented due to the findings from the audit. Such actions will be documented in the field logbook.

3.2.2 Laboratory Audits

EMT will perform many, if not all, of the analytical services required during the assessments. As discussed in Section 1.4.1.2, EMT is an IL- ELAP certified laboratory, and a copy of their ELAP certificate is located in Appendix B. In addition, if any asbestos sampling is performed, analysis will be performed by EMSL, a NVLAP-certified laboratory. A copy of their NVLAP certificate is also contained in Appendix B. As the primary contracted laboratory, EMT will be responsible for all analytical work for this project using SW-846 methods. The EMT QA manager will be responsible for ensuring that the laboratory data precision and accuracy are maintained in accordance with specifications and laboratory SOPs. As a **IL – ELAP** -certified lab, 'Laboratory' is routinely audited by the State of Illinois or the NELAP Accrediting Authority (the State that issued the NELAP certification).

3.3 Reports to Management

For the duration of the project, monthly reports will be prepared by the AECOM project manager and submitted to the Project Engineer and U.S. EPA project manager. These reports will serve to inform the Project Engineer and U.S. EPA of the project progress and any significant interim findings that have been identified. This will streamline the process of addressing issues as they arise and adjusting the program to better define the environmental concerns. At the completion of the assessment, draft and final project reports will be issued.

4.0 DATA VALIDATION/USABILITY

This section describes the QA activities that will be performed to ensure that the collected data are scientifically defensible, properly documented, and of known quality, and meet project objectives. All analytical data collected for the City of Blue Island Brownfield Assessment Project will be validated.

The following three steps will be followed to ensure that project data quality needs are met.

1. **Data Verification** – Data verification is a process of evaluating the completeness, correctness, and contractual compliance of a data set against the method standard, SOP, or contract requirements. Data verification will be performed internally by the analytical group or laboratory generating the data. Additionally, data may be checked by an entity external to the analytical group or fixed laboratory. Data verification may result in accepted, qualified, or rejected data.

2. **Data Validation** – Data validation is an analyte- and sample-specific process that extends the qualification of data beyond method, procedural, or contractual compliance (i.e., data verification) to determine the analytical quality of specific data sets. Data validation criteria are based on the measurement performance criteria of the project QAPP. The group that generates the data will perform data validation. Data validation results are accepted, qualified, or rejected data.

3. **Data Usability Assessment** – Data usability assessment is the process of evaluating validated data to determine if the data can be used for purpose of the project (i.e., to answer the environmental questions or to make environmental decisions). Data usability will include the following sequence of evaluation:

    - First, individual data sets will be evaluated to identify the measurement performance/usability issues or problems affecting the ultimate achievement of project DQOs.

- Second, an overall evaluation of all data generated for the project will be performed.

- Finally, the project-specific measurement performance criteria and data validation criteria will be evaluated to determine if they were appropriate for meeting project DQOs.

In order to perform the data evaluation steps above, the reported data will be supported by complete data packages which include sample receipt and tracking information, COC records, tabulated data summary forms, and raw analytical data for all field samples, standards, QC checks and QC samples, and all other project-specific documents that are generated.

4.1 Instructions for Data Review, Validation, and Verification Requirements

This section describes the process for documenting the degree to which the collected data meet the project objectives, individually and collectively. AECOM will estimate the potential effect that each deviation from this QAPP may have on the usability of associated data items, its contribution to the quality of reduced and analyzed data, and its effects on the decision.

The following procedures will be implemented to verify and validate data collected during the project:

- *Sampling Design* – How closely a measurement represents the actual environment at a given time and location is a complex issue. Each sample will be checked for compliance with the specifications, including type and location. AECOM will note deviations from the specifications, and discuss them with the U.S. EPA project manager.

- *Sample Collection Procedures* – Sample collection procedures identified in this QAPP will be followed. If field conditions require deviations, they will be discussed with the U.S. EPA project manager.

- *Sample Handling* – Deviations from the planned sample handling procedures will be noted on the COC forms and in the field logbooks. Data collection activities will indicate the events that occur during sample handling affecting the integrity of the samples.

  AECOM field technical staff members will evaluate the sample containers and the preservation methods used and ensure that they are appropriate to the nature of the

sample and the type of data generated from the sample. Checks on the identity of the sample will be made to ensure that the sample continues to be representative of its native environment as it moves through the analytical process.

- *Analytical Procedures* – Each sample will be verified to ensure that the procedures used to generate the data were implemented as specified. Data validation activities will be used to determine how seriously a sample deviated beyond the acceptance limit so that the potential effects of the deviation can be evaluated.

- *Quality Control* – QC checks that are to be performed during sample collection, handling, and analysis are specified in an earlier section of this QAPP. For each specified QC check, the procedures, acceptance criteria, and corrective action should be specified. During data validation, the corrective actions that were taken, which samples were affected, and the potential effect of the actions on the validity of the data will be documented.

- *Calibration* – Field and laboratory instrument calibrations will be documented to ensure that calibrations:

  - Were performed within an acceptance time prior to generation of measurement data;
  - Were performed in proper sequence;
  - Included the proper number of calibration points;
  - Were performed using a standard that bracketed the range of reported measurement results; and
  - Had acceptable linearity checks and other checks to ensure that the measurement system was stable when calibration was performed.

When calibration problems are identified, any data produced between the suspect calibration event and any subsequent recalibration will be flagged to alert data users.

- *Data Reduction and Processing* – Checks on data integrity will be performed to evaluate the accuracy of raw data and include the comparison of important events and duplicate rekeying of data to identify data entry errors. Section 12.0 of EMT's QA Manual (Appendix C) discusses their data reduction procedures.

4.2 Instructions for Validation and Verification Methods

This section describes the process that will be followed to verify and validate the project data.

4.2.1 Verification

Field data will be verified by the AECOM QA manager by reviewing field documentation and chain-of-custody records. Data from direct-reading instruments used to measure conductivity, DO, and turbidity will be internally verified by reviewing calibration and operating records. The laboratory data will be verified in respect to the COC, units of measure, and citation of analytical methods. Data verification procedures followed by EMT are discussed in Section 12.4 and 12.5 of the QA Manual (Appendix C), and will include reviewing and documenting sample receipt, sample preparation, sample analysis (including internal QC checks), data reduction, and reporting. Any deviations from the acceptance criteria corrective actions taken, and data determined to be of limited usability (i.e., laboratory-qualified data) will be noted in the case narrative of the laboratory report. The QA manager will also verify the use of blanks and duplicates. All applicable reference and identification codes and numbers will be reviewed as part of the documentation.

4.2.2 Validation

Data validation will be conducted by AECOM consistent with the procedure identified in Section 1.5 of this QAPP. The data verification/validation procedure will identify data as being acceptable, of limited usability qualified or estimated, or rejected. The conditions that result in data being qualified or estimated or rejected are identified in Section 1.5 of this QAPP. The results of the data verification/validation will be provided in data validation memoranda that are provided to AECOM's Project Manager and are included in the Quality Assurance Management Reports. All sampling, handling, field analytical data, and fixed-laboratory data will be validated by entities external to the data generator. The validation procedure will specify the verification

process of every quality control measure used in the field and laboratory. Data validation procedures followed by EMT are discussed in Section 12.4 of the QA Manual (Appendix C).

Each analytical report will be reviewed for compliance with the applicable method and for the quality of the data reported.

Data determined to be unusable may require that corrective action be taken. Potential types of corrective action may include resampling by the field team or reanalysis of the samples by the laboratory. The corrective actions taken are dependant upon the ability to mobilize the field team and whether the data are critical for the project DQOs to be achieved. Should AECOM's QA Officer identify a situation requiring corrective action during data verification/validation, AECOM's Project Manager will be responsible for approving the implementation of the corrective action.

4.3 Instructions for Reconciliation with Data Quality Objectives

This section describes the scientific and statistical procedures/methods that will be used to determine whether data are of the right type, quality, and quantity to support environmental decision making for the project.

The Data Quality Assessment (DQA) process is described in *Guidance for the Data Quality Assessment Process: Practical Methods for Data Analysis*, EPA QA/G-9, July 1996. EPA QA/G-9 will be used to guide the data assessment on this project. The DQA process will consist of five steps:

1. Review DQOs and sampling design
2. Conduct preliminary data review
3. Select statistical test
4. Verify assumptions
5. Draw conclusions from the data.

While the formal DQA process presented in the guidance may not be followed in its entirety, a systematic assessment of the data quality will be performed. This process will include a preliminary data review. Data will be presented in tables and figures to identify the trends, relationships, and anomalies.

The overall usability of the data for the project will be assessed by evaluating the PARCCS of the data set to the measurement performance criteria in Section 1.5 of this QAPP using statistical quantities as applicable. The procedures and statistical formulas to be used for these evaluations are presented in the following sections.

4.3.1 Precision

In order to meet the needs of the project, data must meet the measurement performance criteria for precision. Project precision will be evaluated by assessing the RPD data from the field duplicate samples. Analytical precision will be evaluated by assessing the RPD data from either duplicate spiked sample analyses or duplicate sample analyses. The RPD between two measurements is calculated using the following simplified formula:

$$RPD = \frac{|R_1 - R_2|}{(R_1 + R_2)/2} \times 100$$

where: R_1 = value of first result

R_2 = value of second result.

Overall precision for the sampling programs will be determined by calculating the mean RPD for all field duplicates in a given sampling program. This will provide an evaluation of the overall variability attributable to the sampling procedure, sample matrix, and laboratory procedures in each sampling program.

The overall precision requirement will be the same as the project precision. It should be noted that the RPD of two measurements can be very high when the data approach the quantitation limit of an analysis. The calculation of the mean RPD will include only the RPD values for field duplicate sample analyte data that are greater than or equal to five times the quantitation limit for an analysis.

Poor overall precision may be the result of one or more of the following:

- Field instrument variation
- Analytical measurement variation
- Poor sampling technique

- Sample transport problems
- Heterogeneous matrices.

In order to identify the cause of the imprecision, the field-sampling design rationale and sampling techniques should be evaluated by the reviewer, and both field and analytical duplicate/replicate sample results should be reviewed. If poor precision is indicated in both the field and analytical duplicates/replicates, then the laboratory may be the source of error. If poor precision is limited to the field duplicate/replicate results, then the sampling technique, field instrument variation, sample transport, or heterogeneous sample matrices may be the source of error.

If the Data Validation Report indicates that analytical imprecision exists for a particular data set, then the impact of that imprecision on data usability must be discussed in the Data Assessment Report. It should be noted that the Data Validation Report is considered to be the QA/QC report supplied by the analytical laboratory, and the Data Assessment Report will be prepared by AECOM and submitted as part of the Phase II document.

When project-required precision is not achieved and project data are not usable to adequately address environmental questions and to support project decision making, then the Data Assessment Report should address how this problem will be resolved and discuss the need for resampling.

4.3.2 Accuracy/Bias

In order to meet the needs of the data users, project data will follow the measurement performance criteria for accuracy/bias established in Section 1.5.2.

4.3.2.1 Sample Contamination

QC check samples data will be reviewed to evaluate the accuracy and potential bias of sample results. If field contamination exists, then the impact of field contamination on data usability will be discussed in the Data Assessment Report, and the AECOM project manager and field team leader should be notified. Differentiate field sample collection and transport

contamination from contamination introduced at the time of sample preparation and analysis. Note that sample contamination may result in either negative or positive bias. For example, improperly cleaned sample containers for metals analysis may result in the retention of metals on interior container walls. This would result in lower metals concentrations being reported than are actually present in the environmental sample, which is a negative bias. A positive bias would occur when sample container contamination results in an additive effect, meaning that reported analyte concentrations are higher than the true sample concentrations for that analyte.

4.3.2.2 Analytical Accuracy/Bias

The data from method/preparation blank samples, field blank samples, trip blank sample, surrogate spikes, MS/MSD samples, and LCSs will be used to determine accuracy and potential bias of the sample data. If the Data Validation Reports indicate that contamination and/or analytical inaccuracies/bias exist for a particular data set, then the impact of that contamination and/or analytical inaccuracies/bias on data usability will be discussed on the Data Assessment Report.

4.3.2.3 Overall Accuracy/Bias

The data from the method/preparation blank samples provide an indication of laboratory contamination that may result in bias of sample data. Sample data associated with method/preparation blank contamination will have been identified during the data verification/validation process. Sample data associated with method/preparation blank contamination are evaluated during data validation procedure to determine if analytes detected in the samples and the associated method/preparation blanks are "real" or are the result of laboratory contamination. The procedure for this evaluation involves comparing the concentration of the analyte in the sample to the concentration of the method/preparation blank taking into account adjustments for sample dilution and dry-weight reporting. In general, the sample data are qualified as not detected if the sample concentration is less than five times (ten times for common laboratory contaminants) the method/preparation blank concentration. Typically, the common quantitation limit for the affected analyte is elevated to the concentration detected in the sample.

The data from the field blanks and trip blanks provide an indication of field and transportation conditions that may result in bias of sample data. Sample data associated with contaminated field and trip blank samples have been identified during the data verification/validation process. The evaluation procedure and qualification of sample data associated with field blank and trip blank contamination is performed in the same manner as the evaluation procedure for method blank sample contamination, taking into account the difference in units for aqueous field blank samples collected during soil sampling programs.

Surrogate spike recoveries provide information regarding the accuracy/bias of the organic analyses on an individual sample bias. Surrogate compounds are not expected to be found in the samples and are added to every sample prior to sample preparation/purging. The percent recovery data provide an indication of the effect that the sample matrix may have on the preparation and analysis procedure. Sample data exhibiting matrix effects will have been identified during data verification/validation process.

Matrix spike sample data can provide information regarding the accuracy/bias of the analytical methods relative to the sample matrix. Matrix spike samples are field samples that have been fortified with target analytes prior to sample preparation and analysis. The percent recovery data provide an indication of the effect that the sample matrix may have on the preparation and analysis procedure. Sample data exhibiting matrix effects will have been identified during data verification/validation process.

Analytical accuracy/bias will be determined by evaluating the percent recovery data of LCSs. LCSs are artificial samples prepared in the laboratory using a blank matrix that is fortified with analytes from a standard reference material that is independent of the calibration standards. LCSs are prepared and analyzed in the same manner as the field samples. The data from LCS analyses will provide an indication of the accuracy and bias of the analytical method for each target analyte.

Percent recovery is calculated using the following formula:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

where: SSR = Spiked Sample Result
SR = Sample Result or Background
SA = Spike Added.

The percent recovery of LCSs is determined by dividing the measured value by the true value and multiplying by 100.

Overall accuracy/bias for the sampling events will be determined by calculating the percent accuracy measurements that meet the measurement performance criteria specified in Section 1.5.2 of this QAPP. Overall accuracy will be considered acceptable if the surrogate percent recoveries are met for at least 75 percent of the samples and the LCS percent recoveries are met for all samples and the MS/MSD percent recoveries are met for at least 75 percent of the samples.

The Data Assessment Report will discuss and compare overall contamination and accuracy/bias data from multiple data sets collected for the project for each matrix, analytical parameter, and concentration level. The Data Assessment Report will describe the limitations on the use of the project data if extensive contamination and/or inaccuracy/bias exists or when it is limited to a specific sampling or laboratory analytical group, data set, analytical parameter, or concentration level. The Data Assessment Report will identify qualitative and/or quantitative bias trends in multiple performance evaluation (PE) sample results for each matrix, analytical parameter, and concentration level. The impact of any qualitative and/or quantitative trends in bias on the sample data will be discussed. Any PE samples that have false positive and/or false negative results should be reported and the impact on data usability will be discussed in the Data Assessment Report.

When project-required accuracy/bias is not achieved and project data are not usable to adequately address environmental questions and to support project decision making, then the Data Assessment Report will address how this problem will be resolved and the potential need for resampling.

4.3.3 Sample Representativeness

In order to meet the needs of the data users, project data must meet the measurement performance criteria to sample representativeness specified in Section 1.5.3.

Representativeness of the samples will be assessed by reviewing the results of field audits and the data from field duplicate samples. If field duplicate precision checks indicate potential spatial variability, then this may trigger additional scoping meetings and subsequent resampling in order to collect data that are more representative of a nonhomogeneous site. Overall sample representativeness will be determined by calculating the percent of field duplicate sample data that achieved the RPD criteria specified in Section 1.5.3 of this QAPP. Overall sample representativeness will be considered acceptable if the results of the field audits indicate that the approved sampling methods or alternate acceptable sampling methods were used to collect the samples, and the field duplicates RPD data are acceptable for at least 75 percent of the samples.

The Data Assessment Report will discuss and compare overall representativeness for each matrix, parameter, and concentration level. Data Assessment Reports will describe the limitations on the use of project data when overall nonrepresentative sampling has occurred or when nonrepresentative sampling is limited to a specific sampling group, data set, matrix, analytical parameter, or concentration level. If data are not usable to adequately address environmental questions and/or support project decision making, then the Data Assessment Report will address how this problem will be resolved and discuss potential need for resampling.

4.3.4 Sensitivity and Quantitation Limits

In order to meet the needs of the data user, project data must meet the measurement performance criteria for sensitivity as specified. Low point calibration standards should produce a signal at least ten times the background noise levels and should be part of a linear calibration curve. Document the procedures for calculating method detection limits (MDLs) and quantitation limits (QLs).

4.3.4.1 Overall Sensitivity and Quantitation Limits

The quantitation limits for the sample data will be reviewed to ensure that the sensitivity of the analyses was sufficient to achieve TACO Tier 1 Industrial/Commercial standards. The method/preparation blank sample data and LCSs percent recovery data will be reviewed to assess compliance with the measurement performance criteria specified in Section 1.5.6 of this QAPP.

Overall sensitivity will be assessed by comparing the sensitivity for each monitoring program to the detectability requirements for the analyses. Overall sensitivity will be considered acceptable if quantitation limits for samples are less than the acceptable evaluation criteria (i.e., TACO standards).

It should be noted that quantitation limits may be elevated as a result of high concentrations of target compounds, nontarget compounds, and matrix interferences (collectively known as sample matrix effects). In these cases, the sensitivity of the analyses will be evaluated on an individual sample basis relative to the applicable evaluation criteria. The need to investigate the use of alternate analytical methods may be required if the sensitivity of the analytical methods identified in this QAPP cannot achieve the evaluation criteria because of sample matrix interference.

If Data Validation Reports indicate that sensitivity and/or QLs were not achieved, then the impact of that lack of sensitivity and/or higher QLs on data usability will be discussed in the Data Assessment Report.

The Data Assessment Report will discuss and compare overall sensitivity and QLs from multiple data sets collected for the project for each matrix, analytical parameter, and concentration level. The Data Assessment Report will describe the limitations on the use of the project data if project-required sensitivity and QLs were not achieved for all project data or when it is limited to a specific sampling or laboratory/analytical group, data set, matrix, analytical parameter, or concentration level.

When project-related QLs are not achieved and project data are not usable to adequately address environmental questions and to support project decision making, then the Data Assessment

Report will address how this problem will be resolved and discuss the potential need for resampling. In this case, the Data Assessment Report will clearly differentiate between usable and unusable data for the users.

4.3.5 Completeness

In order to meet the needs of the data users, project data will follow the measurement performance criteria for data completeness outlined in Section 1.5.4.

4.3.5.1 Overall Completeness

Completeness will be assessed by comparing the number of valid (usable) sample results to the total possible number of results within a specific sample matrix and/or analysis. Percent completeness will be calculated using the following formula:

$$\% \text{ Completeness} = \frac{\text{Number of Valid (usable) measurements}}{\text{Number of Measurements Planned}} \text{ X } 100$$

Overall completeness will be assessed by calculating the mean percent completeness for the entire set of data obtained for each sampling program. The overall completeness for the Phase II will be calculated when all sampling and analysis is concluded. Overall completeness will be considered acceptable if at least 90 percent of the data are determined to be valid.

The Data Assessment Report will discuss and compare overall completeness of multiple data sets collected for the project for each matrix, analytical parameter, and concentration level. The Data Assessment Report will describe the limitation on the use of the project data if project-required completeness was not achieved for the overall project or when it is limited to a specific sampling or laboratory/analytical group, data set, analytical parameter, or concentration level.

When project-required completeness is not achieved and sufficient data are not available to adequately address environmental questions and support project decision making, then the Data

Assessment Report will address how this problem will be resolved and discuss the potential need for additional resampling.

4.3.6 Comparability

In order to meet the needs of the data users, project data will follow the measurement performance criteria for comparability outlined in Section 1.5.5.

The comparability of data sets will be evaluated by reviewing the sampling and analysis methods used to generate the data for each data set. Project comparability will be determined to be acceptable if the sampling and analysis methods specified in this QAPP and any approved QAPP revisions or amendments are used for generating the soil, groundwater, sediment, and surface water data.

The Data Assessment Report will discuss and compare overall comparability between multiple data sets collected for the project for each matrix, analytical parameter, and concentration level. The Data Assessment Report will describe the limitation on the use of project data when project-required data comparability is not achieved for the overall project or when it is limited to a specific sampling or laboratory/analytical group, data set, matrix, analytical parameter, or concentration level.

For long-term monitoring projects, data comparability is extremely important. Project data will be compared to previously generated data to determine the possibility of false positives and/or false negatives. Variations detected in the data may reflect a changing environment or indicate sampling and/or analytical error. Comparability criteria will be established to evaluate these data sets in order to identify statistical outliers to trigger resampling as verified.

If it is determined that long-term monitoring data are not comparable, the Data Assessment Report will address whether the data indicate a changing environment or the anomalies are a result of sampling and/or analytical error. If data are not usable to adequately address

environmental questions and/or support project decision making, then the Data Assessment Report will address how this problem will be resolved.

Overall comparability of data from split samples (samples that are collected at the same time from the same location and split equally between two parties using sample containers from the same source or vendor) will be evaluated by determining the RPD of detected analytes in both samples following data verification/validation. Analytes that are detected in only one of the two samples will be assessed by reviewing the data verification/validation reports for both data sets and determining the cause of the discrepancy. Overall comparability of split sample data will be considered acceptable if the RPD for detected analytes with concentrations greater than or equal to five times their respective quantitation limits does not exceed RPD acceptance criteria for field duplicate samples.

If screen/confirmatory comparability criteria are not met, then this will be documented in the Data Assessment Report and the effect on data usability will be discussed. If oversight split-sampling comparability criteria are not met, then this will be documented in the Data Assessment Report and the effect on data usability will be discussed. If data are not usable to adequately address environmental questions and/or support project decision making, then the Data Assessment Report will address how this problem will be resolved and discuss potential need for resampling.

Overall comparability of data from the groundwater monitoring program will be assessed by evaluating analyte concentrations over time. The data from monitoring events will be evaluated for trends, if necessary, using the Mann-Kendall test described in Section 4.3.4.1 of EPA QA/G-9. Suspected outliers will be assessed using the Extreme Value Test described in Section 4.4.3 of EPA QA/G-9. As the groundwater database becomes larger, it may be necessary to use different statistical methods to determine trends and outliers. Any changes to the statistical methods used for this project will be communicated to the U.S. EPA prior to initiating the change.

4.3.7 Data Limitations and Actions

Sources of sampling and analytical error will be identified and corrected as early as possible to the onset of sample collection activities. An ongoing data assessment process will be incorporated during the project, rather than just as a final step, to facilitate the early detection and correction of problems, ensuring that project quality objectives are met.

Data that do not meet the measurement performance criteria specified in this QAPP will be identified and the impact on the project quality objectives will be assessed and discussed within the

Phase II. Specific actions for data that do not meet the measurement performance criteria depend on the use of the data and may require that additional samples are collected or the use of the data to be restricted.

5.0 REFERENCES

United States Environmental Protection Agency. 1993. *Data Quality Objectives Process for Superfund: Interim Final Guidance*. EPA 540-R-93-071, Office of Research and Development, Washington DC.

United States Environmental Protection Agency. 1994. *Guidance for Data Quality Assessments*. EPA QA/G-5, Office of Research and Development, Washington DC.

United States Environmental Protection Agency. 1996. *Guidance for the Data Quality Assessment Process: Practical Methods for Data Analysis*. EPA QA/G-9, Office of Research and Development, Washington DC.

Table 1

Estimated Project Schedules

TABLE 1

Blue Island TOD Areas Brownfield's Redevelopment – Estimated Project Schedule

Task	Date
QAPP Submittal	February 17, 2009
Completion of Phase I Environmental Site Assessments	February 20, 2009
Selection of Sites for Asbestos Inspections	March 27, 2009
Selections of Sites for Phase II Subsurface Investigations	March 27, 2009
QAPP Approval	April 17, 2009
Scheduling Phase II Investigations and Asbestos Inspections	April 6 – 10, 2009
Conduct Phase II Investigations and Asbestos Inspections	April 13 – 17, 2009
Submit Phase II Investigations and Asbestos Inspections Reports	May 6, 2009

Table 2 - Laboratory Analyses by Laboratory	
Laboratory Name	**Analyses to be performed/Method number/media, if other than soil and water**
EMT, Inc (Morton Grove, IL)	VOCs (8260), SVOCs (8270), Pesticides(8081)
	PCBs (8082), Herbicides (8321), PAH (8310)
	~~VOCs (air - TO-14)~~ N/A
	Metals (6010), Mercury(7470/7471)
	Cyanide (9010), Hexavalent chromium (7196)
EMSL Analytical (Chicago, IL)	Asbestos (NISOH 7400/bulk)
	lead testing (SW846-7420/Paint chips)

Table 3B - Analytical Parameters, Laboratory Reporting Values, IEPA TACO Soil and Groundwater Objectives, and Laboratory Accuracy and Precision Values
TOD AREA REDEVELOPMENT
Blue Island, Illinois

VOCs Analytical Results

Chemical Name	IEPA TACO SOIL AND GROUNDWATER OBJECTIVES						LABORATORY DETECTION LIMITS				Soil			Groundwater		
	Exposure Route-Specific SROs*(mg/kg)		Soil Component of GW Ingestion Route*(mg/kg)		GRO (mg/L)*		Soil (mg/kg)		Groundwater (mg/L)		LCS recovery %	MS/MSD recovery %	RPD% between MS/MSD	LCS recovery %	MS/MSD recovery %	RPD% between MS/MSD
	Residential															
	ingestion	Inhalation	Class I	Class II	Class I	Class II	MDL	PQL	MDL	PQL						
1,1,1-Trichloroethane	NRO	1,200	2	9.6	0.2	1	0.00032	0.005	0.00035	0.002	71.8-136	26.1-141	57.3	75-135	58.5-152	20
1,1,2,2-Tetrachloroethane^	310	2,000	0.22	0.22	0.42	0.42	0.00084	0.005	0.00023	0.002	71.5-146	10-150	58.3	70-135	58.7-144	20
1,1,2-Trichloroethane	310	1,800	0.02	0.3	0.005	0.05	0.0004	0.005	0.00022	0.002	75.5-125	10-190	55.9	75-125	72.4-137	15
1,1-Dichloroethane	7,800	1,300	23	110	0.7	3.5	0.00028	0.005	0.00032	0.002	70.5-140	38-127	55	70-130	60-125	20
1,1-Dichloroethene	3,900	290	0.06	0.3	0.007	0.035	0.0004	0.005	0.00075	0.002	75.1-144	38.2-128	54.8	70-130	60-115	15
1,2-Dibromo-3-chloropropane	0.46	11	0.002	0.002	0.0002	0.0002	0.005	0.005	0.001	0.002	56.4-142	10-140	53.5	50-150	48.4-142	20
1,2-Dibromoethane	0.0075	0.17	0.000	0.004	0.00005	0.0005	0.00064	0.005	0.00017	0.002	72.3-123	14.1-148	67.7	70-130	71.7-123	20
1,2-Dichloroethane	7	0.4	0.02	0.1	0.005	0.025	0.0006	0.005	0.0002	0.002	66-137	25.9-151	52.7	70-130	65.4-151	20
1,2-Dichloropropane	9	15	0.03	0.15	0.005	0.025	0.00064	0.005	0.00022	0.002	76.5-140	31.6-133	55.9	75-125	65-135	20
1,3-Dichloropropene (cis & trans)	6.4	11	0.004	0.02	0.001	0.005	0.00108	0.002	0.00038	0.004	60-140	70-130	30	50-150	77.4-130	20
1-Butanol	7,800	10,000	17	17	0.7	0.7	0.0144	0.25	0.0254	0.1	70-130	56-131	107	40-160	10-190	20
2- Butanone (MEK)^	NRO	NRO	NRO	NRO	NRO	NRO	0.0024	0.05	0.0023	0.02	64.3-146	10-752	85.5	50-150	57.9-142	20
2-Hexanone^	NRO	NRO	NRO	NRO	NRO	NRO	0.00128	0.05	0.00101	0.02	64.4-142	10-190	30	50-150	62.9-119	20
4-Methyl-2-Pentanone (MIBK)^	NRO	3,100	NRO	NRO	NRO	NRO	0.00116	0.05	0.00257	0.02	44.1-161	10-190	63.3	60-140	55.9-135	20
Acetone	70,000	100,00	16	16	6.3	6.3	0.04	0.12	0.00428	0.04	49.1-159	10-125	30	40-160	35.7-150	20
Acrylonitrile^	1.2	0.29	0.0006	0.0006	0.001	0.001	0.00132	0.005	0.00367	0.02	58.2-145	10-190	63.6	60-130	48.1-158	20
Benzene	12	0.8	0.03	0.17	0.005	0.025	0.00024	0.005	0.00024	0.002	84.9-127	10-153	31.4	70-130	60-120	20
Bromodichloromethane	10	3,000	0.6	0.6	0.0002	0.0002	0.0006	0.005	0.00027	0.002	75.4-127	23.5-136	64.9	80-125	66.6-141	20
Bromoform	81	53	0.8	0.8	0.001	0.001	0.00064	0.005	0.00025	0.002	67.4-130	8.68-125	58.6	70-125	60.9-128	20

Table 3B - Analytical Parameters, Laboratory Reporting Values, IEPA TACO Soil and Groundwater Objectives, and Laboratory Accuracy and Precision Values
TOD AREA REDEVELOPMENT
Blue Island, Illinois

Chemical Name	IEPA TACO SOIL AND GROUNDWATER OBJECTIVES						LABORATORY DETECTION LIMITS				Soil			Groundwater		
	Exposure Route-Specific SROs*(mg/kg)		Soil Component of GW Ingestion Route*(mg/kg)		GRO (mg/L)*		Soil (mg/kg)		Groundwater (mg/L)		LCS recovery %	MS/MSD recovery %	RPD% between MS/MSD	LCS recovery %	MS/MSD recovery %	RPD% between MS/MSD
	Residential															
	Ingestion	Inhalation	Class I	Class II	Class I	Class II	MDL	PQL	MDL	PQL						
Bromomethane	110	10	0.2	1.2	0.0098	0.049	0.00248	0.01	0.00023	0.002	65.8-177	10-160	58.4	50-150	10-190	25
Carbon disulfide	7,800	720	32	160	0.7	3.5	0.0008	0.005	0.00041	0.002	72.7-154	4.9-135	99.3	60-150	46.6-158	25
Carbon Tetrachloride	5	0.3	0.07	0.33	0.005	0.025	0.00052	0.005	0.00033	0.002	64.9-135	14.7-134	62.4	70-130	57.4-137	20
Chlorobenzene	1,600	130	1	6.5	0.1	0.5	0.00048	0.005	0.00019	0.002	70.3-129	3.47-130	58.9	70-130	42.3-133	20
Chloroethane^	NRO	1,500	NRO	NRO	NRO	NRO	0.00116	0.01	0.0005	0.002	46.2-176	44.5-135	57.1	60-140	21.6-216	20
Chloroform	100	0.3	0.6	2.9	0.0002	0.001	0.00052	0.005	0.00026	0.002	75.1-127	30.5-139	54.3	75-125	60-125	10
Chloromethane^	NRO	NRO	NRO	NRO	NRO	NRO	0.00148	0.01	0.00026	0.002	10.1-164	10-190	57.2	60-140	16.2-189	15
cis-1,2-Dichloroethene	780	1,200	0.4	1.1	0.07	0.2	0.00104	0.005	0.00038	0.002	88-130	34.7-132	69.3	80-130	47.8-159	20
Dibromochloromethane	1,600	1,300	0.4	0.4	0.14	0.14	0.00084	0.005	0.00022	0.002	69.6-127	13.9-132	57	70-130	67.3-127	20
Ethylbenzene	7,800	400	13	19	0.7	1	0.0004	0.005	0.00015	0.002	64.5-127	10-138	32.4	70-130	60-125	20
Methyl tert-butyl ether	780	8,800	0.32	0.32	0.0700	0.0700	0.00084	0.005	0.00024	0.002	61.2-138	10-173	29.1	50-150	46.3-149	20
Methylene chloride	85	13	0.02	0.2	0.005	0.05	0.002	0.01	0.000198	0.002	72.5-131	38.9-136	42.5	70-130	64.3-148	20
Styrene	16,000	1,500	4	18	0.1	0.5	0.00072	0.005	0.00026	0.002	66.2-131	10-301	76.6	70-130	24.6-145	25
Tetrachloroethene	12	11	0.06	0.3	0.005	0.025	0.00036	0.005	0.00044	0.002	11.2-168	10-190	67.7	60-140	11-126	15
Toluene	16,000	650	12	29	1	2.5	0.00184	0.005	0.00015	0.002	68.4-120	10-135	30.3	70-130	70-120	25
trans-1,2-Dichloroethene	1,600	3,100	0.7	3.4	0.1	0.5	0.00052	0.005	0.00031	0.002	78.4-142	31-128	65.2	70-130	49.5-168	25
Trichloroethene	58	5	0.06	0.3	0.005	0.025	0.00036	0.005	0.00026	0.002	69.1-127	18.2-135	56.6	70-130	55.6-132	20
Vinyl Acetate	78,000	1,000	170	170	7.0	7.0	0.001	0.01	0.00021	0.002	39.1-167	10-112	45.5	50-150	49.2-167	20
Vinyl chloride	0.46	0.28	0.01	0.07	0.002	0.01	0.00092	0.005	0.000093	0.002	31.9-168	10-177	64.3	75-135	45-135	20
Xylenes (total)	160,000	320	150	150	10.0	10.0	0.001	0.015	0.00059	0.006	65.2-126	10-190	33.2	70-130	18.5-172	20

Notes

* Illinois EPA Tier 1 Soil Remediation Objectives (SROs): 35 IAC 742, Appendix B, Table A (Residential)

All soil results in parts per million (mg/Kg) based on dry weight unless noted otherwise.
All groundwater results in parts per million (mg/L) unless noted otherwise.
NRO = No Remediation Objective
^--Non-TACO Chemical. Limits prepared by IEPA Toxicity Assessment Unit - 01/06/09.
MDL is the method detection limit
PQL is the reporting limit which will be corrected based on the moisture in the samples
EMT does not have accuracy or precision values. EMT has included the recovery levels for the laboratory control

Table 3C - Analytical Parameters, Laboratory Reporting Values, IEPA TACO Soil and Groundwater Objectives, and Laboratory Accuracy and Precision Values
TOD AREA REDEVELOPMENT
Blue Island, Illinois

Soil Total Metals Analytical Results

IEPA TACO SOIL AND GROUNDWATER					LABORATORY DETECTION LIMITS				Soil			Groundwater		
Chemical Name	Exposure Route-Specific SROs*(mg/kg)		GRO (mg/L)*		Soil (mg/kg)		Groundwater (mg/L)							
	Residential								LCS recovery %	MS/MSD recovery %	RPD% between MS/MSD	LCS recovery %	MS/MSD recovery %	RPD% between MS/MSD
	ingestion	inhalation	Class I	Class II	MDL	PQL	MDL	PQL						
Aluminum	NRO	NRO	NRO	NRO	0.796	1	0.0035	0.013	80-120	75-125	0-20	80-120	75-125	0-20
Antimony	31	NRO	0.006	0.024	0.183	0.5	0.0011	0.0033	80-121	75-125	0-20	80-120	75-125	0-20
Arsenic	NRO	750	0.05	0.2	0.101	0.5	0.0007	0.002	82.1-114	75-125	0-20	85.3-114	75-125	0-20
Barium	5,500	690,000	2	2	0.082	0.5	0.0016	0.005	81.7-107	75-125	0-20	85.7-120	75-125	0-20
Beryllium	160	1,300	0.004	0.5	0.069	0.5	0.0008	0.0024	82.4-120	75-125	0-20	87.7-120	75-125	0-20
Cadmium	78	1,800	0.005	0.05	0.072	0.5	0.0004	0.001	80.6-105	75-125	0-20	86.8-120	82.1-124	0-20
Calcium	NRO	NRO	NRO	NRO	6.998	15	0.0701	0.2103	80-120	75-125	0-20	80-120	75-125	0-20
Chromium	230	270	0.1	1	0.558	0.5	0.0013	0.004	80-120	75-125	0-20	91.6-114	84.4-122	0-20
Cobalt	4700	NRO	1	1	0.061	0.5	0.0026	0.0078	80-120	75-125	0-20	85.6-117	75-125	20
Copper	2,900	NRO	0.65	0.65	0.178	0.5	0.0013	0.0039	82.8-110	75-125	0-20	88.6-119	75-125	0-20
Iron	NRO	NRO	5	5	2.532	5	0.0144	0.0432	80-120	75-125	0-20	83.9-120	75-125	0-20
Lead	400	NRO	0.0075	0.1	0.099	0.5	0.0002	0.0006	80.7-110	75-125	0-20	85.5-120	87.5-123	9.45
Magnesium	NRO	NRO	NRO	NRO	0.805	1	0.0675	0.2025	80-120	75-125	0-20	86.7-120	75-125	0-20
Manganese	3,700	69,000	0.15	10	0.076	0.5	0.003	0.009	80-118	75-125	0-20	88.1-115	75-125	0-20
Mercury	23	10	0.002	0.01	0.01068	0.03	0.0000797	0.00025	85.9-119	75-125	0-20	92.6-109	75-125	0-20
Nickel	1,600	13,000	0.1	2	0.313	0.5	0.0018	0.0054	84.9-108	75-125	0-20	88.7-119	75-125	0-20
Potassium	NRO	NRO	NRO	NRO	3.083	5	0.0606	0.1818	80-120	75-125	0-20	86.8-118	75-125	0-20
Selenium	390	NRO	0.05	0.05	0.201	0.5	0.0003	0.001	80-120	75-125	0-20	84.2-115	75-125	0-20
Silver	390	NRO	0.05	NRO	0.249	0.5	0.0011	0.0033	80.4-109	75-125	0-20	80.8-120	75-125	0-20
Sodium	NRO	NRO	NRO	NRO	2.858	5	0.0667	0.2001	80-120	75-125	0-20	91.3-120	75-125	0-20
Thallium	6.3	NRO	0.002	0.02	0.073	0.5	0.0002	0.0006	80-120	75-125	0-20	86.7-116	75-125	0-20
Vanadium	550	NRO	0.049	0.1	0.139	0.5	0.0027	0.0081	80-120	75-125	0-20	80-120	75-125	0-20
Zinc	23,000	NRO	5	10	0.703	0.75	0.0023	0.0069	80.1-111	75-125	0-20	85.7-119	75-125	0-20
Chromium, ion, hexavalent	6,100	420	NRO	NRO	1.81	10	0.0069	0.01	90-110	90.5-108	20	90-110	85-115	10
Cyanide	41,000	21,000	0.2	0.6	0.0144	0.04	0.0144	0.04	85-112	80-120	7.17	85-112	80-120	7.17
Organic Carbon, Total	NRO	NRO	NRO	NRO	40.8	300	0.55	1	80-120	80-120	20	80-120	70-130	15
pH (reporting units=s.u.)	NRO	NRO	NRO	NRO	NA	NA	NA	NA	99-101	NA	10	98-102	NA	10

Notes

* Illinois EPA Tier 1 Soil Remediation Objectives (SROs); 35 IAC 742, Appendix B, Table A (Residential)

All soil results in parts per million (mg/Kg) based on dry weight unless noted otherwise.

All groundwater results in parts per million (mg/L) unless noted otherwise.

NRO - No Remediation Objective; NA - Not available

^--Non-TACO Chemical. Limits prepared by IEPA Toxicity Assessment Unit - 01/06/09.

MDL is the method detection limit

PQL is the reporting limit which will be corrected based on the moisture in the samples EMT does not have accuracy or precision values. EMT has included the recovery levels for the laboratory control sample (LCS), the matrix spike/matrix spike dup (MS/MSD) and the %RPD or error between the MS/MSD. The LCS is a blank spike and indicates accuracy for the method while the MS/MSD indicate the accuracy for matrices. The RPD indicates the precision. These values change routinely as they are statistically generated.

Table 3A - Analytical Parameters, Laboratory Reporting Values, IEPA TACO Soil and Groundwater Objectives, and Laboratory Accuracy and Precision Values
TOD AREA REDEVELOPMENT
Blue Island, Illinois

Soil Semivolatiles Analytical Results

Chemical Name	IEPA TACO SOIL AND GROUNDWATER OBJECTIVES						LABORATORY DETECTION LIMITS				Soil			Groundwater		
	Exposure Route-Specific SROs*(mg/kg)		Soil Component of GW Ingestion Route*(mg/kg)		GRO (mg/L)*		Soil (mg/kg)		Groundwater (mg/L)		LCS recovery %	MS/MSD recovery %	RPD% between MS/MSD	LCS recovery %	MS/MSD recovery %	RPD% between MS/MSD
	Residential															
	ingestion	inhalation	Class I	Class II	Class I	Class II	MDL	PQL	MDL	PQL						
1,2,4-Trichlorobenzene	780	3,200	5	53	0.07	0.7	0.00070	0.00444	0.00036	0.00100	9.87-87.2	39-188	50	40-100	44-142	50
1,2-Dichlorobenzene	7,000	560	17	43	0.6	1.5	0.00057	0.00444	0.00028	0.00100	10.5-77.6	15-168	50	40-100	32-129	50
1,4-Dichlorobenzene	NRO	11,000	2	11	0.075	0.375	0.00372	0.01120	0.00037	0.00100	10.1-77.4	18-168	50	40-100	15.6-100	52.9
2,4,5-Trichlorophenol	7,800	NRO	270	1400	0.7	0.7	0.02596	0.07790	0.00357	0.01071	11.2-95.6	56-167	50	40-100	37.7-130	31.9
2,4,6-Trichlorophenol	58	200	0.20	0.77	0.01	0.01	0.01864	0.11100	0.00362	0.01086	4.54-106	41-168	50	40-100	35.8-124	38.2
2,4-Dichlorophenol	230	NRO	1	1	0.021	0.021	0.00389	0.04440	0.00382	0.01146	7.18-97.1	8-155	50	30-100	39-135	50
2,4-Dimethylphenol	1,600	NRO	9	9	0.14	0.14	0.00894	0.04440	0.00481	0.01443	5.37-97.8	10-168	50	36.4-97.5	32-119	50
2,4-Dinitrophenol	160	NRO	0.2	0.2	0.014	0.014	0.02484	0.22200	0.02688	0.08064	5-153	0-122	50	0.535-161	0-191	50
2,4-Dinitrotoluene	0.9	NRO	0.0008	0.0008	0.00002	0.00002	0.01644	0.11100	0.00302	0.02500	6.06-118	29-145	50	51.1-124	50.7-112	20.9
2,6-Dinitrotoluene	0.9	NRO	0.0007	0.0007	0.00031	0.00031	0.02363	0.11100	0.00494	0.01482	4.37-113	34-182	50	44.5-117	50-158	50
2-Chloronaphthalene^	6,300	NRO	49	240	0.56	2.8	0.00042	0.00444	0.00049	0.00100	7.82-95.6	54-170	50	44.6-103	60-118	50
2-Chlorophenol	390	53,000	4	20	0.035	0.035	0.00046	0.00444	0.00269	0.00807	12.7-81.4	18-92	50	33.5-105	23-134	50
3,3'-Dichlorobenzidine	1.00	NRO	0.007	0.033	0.02	0.1	0.06075	0.18230	0.00199	0.01000	11.8-113	10-195	50	29.6-140	0-262	50
4,6-Dinitro-2-methylphenol^	7.8	NRO	pH specific	pH specific	0.0007	0.0007	0.02916	0.22200	0.00626	0.05000	5-137	0-82	50	10.2-139	0-181	50
4-Bromophenyl phenyl ether	NRO	NRO	NRO	NRO	NRO	NRO	0.00263	0.00888	0.00045	0.00100	8.92-106	29-142	50	46.6-116	53-127	50
4-Chloro-3-methylphenol	NRO	NRO	NRO	NRO	NRO	NRO	0.02254	0.11100	0.00306	0.00918	7.02-104	12-165	50	46-101	22-147	50
4-Chloroaniline	310	NRO	0.7	0.7	0.028	0.028	0.11835	0.11840	0.00041	0.00100	10.3-75	10-151	50	16-101	31-116	50
4-Chlorophenyl phenyl ether	NRO	NRO	NRO	NRO	NRO	NRO	0.00129	0.00888	0.00026	0.00100	11-93.9	45-166	50	47-109	25-158	50
4-Nitrophenol	NRO	NRO	NRO	NRO	NRO	NRO	0.00914	0.04440	0.00394	0.02500	9.17-107	5-165	50	5-120	0-132	50

Table 3A - Analytical Parameters, Laboratory Reporting Values, IEPA TACO Soil and Groundwater Objectives, and Laboratory Accuracy and Precision Values

TOD AREA REDEVELOPMENT

Blue Island, Illinois

Chemical Name	IEPA TACO SOIL AND GROUNDWATER OBJECTIVES						LABORATORY DETECTION LIMITS				Soil			Groundwater		
	Exposure Route-Specific SROs*(mg/kg)		Soil Component of GW Ingestion Route*(mg/kg)		GRO (mg/L)*		Soil (mg/kg)		Groundwater (mg/L)		LCS recovery %	MS/MSD recovery %	RPD% between MS/MSD	LCS recovery %	MS/MSD recovery %	RPD% between MS/MSD
	Residential															
	ingestion	inhalation	Class I	Class II	Class I	Class II	MDL	PQL	MDL	PQL						
Acenaphthene	4,700	NRO	570	2,900	0.42	2.1	0.00030	0.00444	0.00031	0.00100	8.67-97.4	13.6-108	50	46.8-104	47-145	50
Acenaphthylene^	2,300	NRO	85	420	0.21	1.05	0.00448	0.02220	0.00031	0.00100	3.8-103	15.7-75.8	24	43.7-107	33-145	50
Anthracene	23,000	NRO	12,000	59,000	2.1	10.5	0.00280	0.02220	0.00028	0.00100	8.5-109	6.12-126	25.5	44.6-120	27-133	50
Benz(a)anthracene	0.9	NRO	2	8.00	0.00013	0.00065	0.00148	0.02220	0.00036	0.00100	10-122	12.1-132	25.1	46.2-136	33-143	50
Benzo(a)pyrene	0.003	0.009	8	82	0.0002	0.002	0.00412	0.11100	0.00036	0.02500	10.8-119	12.3-124	27	46.9-127	17-163	50
Benzo(b)fluoranthene	0.09	NRO	5	25	0.00018	0.0009	0.00197	0.04440	0.00038	0.00100	10.4-118	25.7-122	37.9	47.3-121	24-159	50
Benzo(g,h,i)perylene^	0.9	NRO	27000	130,000	0.21	1.05	0.00184	0.11100	0.0004	0.02500	11.9-115	5-150	33.9	55.4-126	0-219	50
Benzo(k)fluoranthene	2,300	NRO	49	250	0.00017	0.00085	0.00048	0.02220	0.00044	0.00100	7.57-116	6.08-137	28.1	47.3-138	11-162	50
Bis(2-chloroethoxy)methane	9.00	NRO	NRO	NRO	NRO	NRO	0.00062	0.00444	0.0021	0.00630	4.64-92.8	5-106	30.2	43.9-105	33-184	50
Bis(2-chloroethyl)ether	0.6	0.2	0.0004	0.0004	0.01	0.01	0.00035	0.00444	0.00044	0.00100	11.2-81.1	5.93-102	32.7	41.8-103	12-158	50
Bis(2-chloroisopropyl)ether^	3,100	1,300	2.4	2.4	0.28	0.28	0.00057	0.00444	0.00087	0.00100	8.14-82.2	5-103	35.4	39.4-108	36-166	50
Bis(2-ethylhexyl)phthalate	46	31,000	3,600	31,000	0.006	0.06	0.02167	0.22200	0.00084	0.05000	18.5-107	13.4-147	28.2	41.6-150	8-158	50
Butyl benzyl phthalate	16,000	930	930	930	1.4	7.0	0.02435	0.11100	0.0033	0.01000	3.39-129	5-165	28.4	37.8-138	0-152	50
Carbazole	32	NRO	0.6	2.8	NRO	NRO	0.00373	0.02220	0.00268	0.00804	17.9-99.8	59-189	50	46.5-123	48-124	50
Chrysene	88	NRO	160	800	0.0015	0.0075	0.00042	0.00888	0.00045	0.00100	11.8-115	55-165	50	48.5-131	54-122	50
Dibenzo(a,h)anthracene	NRO	NRO	2	7.6	0.0003	0.0015	0.00461	0.11100	0.00048	0.02500	7.9-86.6	31-167	50	15.9-124	0-227	50
Diethyl phthalate	1,600	10,000	470	470	5.6	5.6	0.01656	0.04970	0.00037	0.00100	8.19-114	45-165	50	5-107	0-114	50
Dimethyl phthalate	0.09	NRO	NRO	NRO	NRO	NRO	0.00144	0.00888	0.00049	0.00100	9.21-107	22-164	50	5-76.6	0-112	50
Di-N-butyl phthalate	63,000	2,000	2,300	2,300	0.7	3.5	0.01875	0.11100	0.00022	0.02500	5-131	48-177	50	48-128	1-118	50
Di-N-octyl phthalate	NRO	NRO	10,000	10,000	0.14	0.7	0.00691	0.11100	0.00052	0.02500	3.41-132	59-165	50	26.8-141	5-146	50
Fluoranthene	3,100	NRO	4,300	21,000	0.28	1.4	0.00043	0.04440	0.00035	0.00100	29.6-89.8	56-168	50	46.4-130	47.9-123	50

Table 3A - Analytical Parameters, Laboratory Reporting Values, IEPA TACO Soil and Groundwater Objectives, and Laboratory Accuracy and Precision Values
TOD AREA REDEVELOPMENT
Blue Island, Illinois

Chemical Name	IEPA TACO SOIL AND GROUNDWATER OBJECTIVES						LABORATORY DETECTION LIMITS				Soil			Groundwater		
	Exposure Route-Specific SROs*(mg/kg)		Soil Component of GW Ingestion Route*(mg/kg)		GRO (mg/L)*		Soil (mg/kg)		Groundwater (mg/L)		LCS recovery %	MS/MSD recovery %	RPD% between MS/MSD	LCS recovery %	MS/MSD recovery %	RPD% between MS/MSD
	Residential															
	ingestion	inhalation	Class I	Class II	Class I	Class II	MDL	PQL	MDL	PQL						
Fluorene	3,100	NRO	560	2800	0.28	1.4	0.00025	0.00888	0.00043	0.00100	11.2-101	42-154	50	49.6-110	59-121	50
Hexachlorobenzene	0.4	1	2	11	0.00006	0.0003	0.00063	0.00888	0.00037	0.00100	13.6-104	34-188	50	58.1-116	53.3-112	28.3
Hexachlorobutadiene^	78	150	2.2	11	0.007	0.035	0.00589	0.01770	0.00041	0.00100	9.76-85.8	5-154	50	30.6-104	20.4-116	50.7
Hexachlorocyclopentadiene	550	10	400	2200	0.05	0.5	0.01658	0.22200	0.00398	0.01194	5-89.1	0-75	50	5-91.2	0-84	50
Hexachloroethane	78	NRO	0.50	2.60	0.007	0.035	0.00289	0.00867	0.00048	0.00100	11.5-79.4	5-198	50	32.5-100	5-124	55.2
Indeno(1,2,3-cd)pyrene	0.9	NRO	14	69	0.00043	0.00215	0.00478	0.11100	0.00034	0.05000	12.7-111	52-183	50	50.5-125	0-171	50
Isophorone	15,600	4,600	8	8	1.4	1.4	0.00347	0.04440	0.00043	0.00100	5-88.4	18-169	50	17.9-101	21-196	50
3 & 4-Methylphenol (m & p-cresol)^	390	NRO	0.2	0.2	0.035	0.035	0.00506	0.02220	0.00403	0.01209	11.2-83.8	9-155	50	29.1-103	34.5-112	36.4
Naphthalene	0.09	NRO	12	18	0.14	0.22	0.00027	0.00888	0.00041	0.00100	10.8-87.3	52-186	50	40.1-99.3	21-133	50
Nitrobenzene	130	NRO	0.10	0.10	0.0035	0.0035	0.00393	0.02220	0.00081	0.00100	7.93-89.6	5-159	50	36.8-113	22.4-129	47.2
N-Nitrosodi-N-propylamine	1,600	170	0.00005	0.00005	0.0018	0.0018	0.00158	0.00888	0.00087	0.00100	10.8-89.7	11.9-101	30.2	45-107	0-230	50
N-Nitrosodiphenylamine	39	92	1.0	5.6	0.0032	0.016	0.00768	0.02300	0.0003	0.00100	9.66-103	22.1-128	50	44.2-121	48-101	50
2-Methylphenol (o-cresol)	3,900	NRO	15	15	0.35	0.35	0.00562	0.02220	0.00416	0.01248	11.7-81	22-164	50	30.4-104	23.6-118	39.1
Pentachlorophenol	3.00	NRO	0.03	0.14	0.001	0.005	0.01725	0.11100	0.00298	0.02500	5-114	5-118	29.5	16.4-101	5-160	33
Phenanthrene^	2300	NRO	200	1000	0.21	1.05	0.00034	0.00444	0.00027	0.00100	12.2-104	14.7-124	28.2	45.1-117	42-123	50
Phenol	23,000	NRO	100	100	0.1	0.1	0.00336	0.01010	0.00281	0.00843	13.1-83.7	7.74-71.1	31.8	17.1-66.5	5-112	50
Pyrene	2,300	NRO	4,200	21,000	0.21	1.05	0.00057	0.02220	0.00043	0.00100	7.21-123	25.7-135	25.5	45-135	52-115	50

Notes

* Illinois EPA Tier 1 Soil Remediation Objectives (SROs); 35 IAC 742, Appendix B, Table A (Residential)
All soil results in parts per million (**mg/Kg**) based on dry weight unless noted otherwise.
All groundwater results in parts per million (**mg/L**) unless noted otherwise.
NRO = No Remediation Objective
^--Non-TACO Chemical. Limits prepared by IEPA Toxicity Assessment Unit - 01/06/09.
MDL is the method detection limit
PQL is the reporting limit which will be corrected based on the moisture in the samples
EMT does not have accuracy or precision values. EMT has included the recovery levels for the laboratory control sample (LCS), the matrix spike/matrix spike dup (MS/MSD) and the %RPD or error between the MS/MSD. The LCS is a blank spike and indicates accuracy for the method while the MS/MSD indicate the accuracy for matrices. The RPD indicates the precision. These values change routinely as they are statistically generated.

Table 3F - Analytical Parameters, Laboratory Reporting Values, IEPA TACO Soil and Groundwater Objectives, and Laboratory Accuracy and Precision Values
TOD AREA REDEVELOPMENT
Blue Island, Illinois

Soil Semivolatiles Analytical Results																
Chemical Name	IEPA TACO SOIL AND GROUNDWATER OBJECTIVES						LABORATORY DETECTION LIMITS				Soil			Groundwater		
	Exposure Route-Specific SROs* (mg/kg)		Soil Component of GW Ingestion Route*(mg/kg)		GRO (mg/L)*		Soil (mg/Kg)		Groundwater (mg/L)		LCS recovery %	MS/MSD recovery %	RPD% between MS/MSD	LCS recovery %	MS/MSD recovery %	RPD% between MS/MSD
	Residential															
	ingestion	inhalation	Class I	Class II	Class I	Class II	MDL	PQL	MDL	PQL						
Acenaphthene	4,700	NRO	570	2,900	0.42	2.1	0.0250	0.0250	0.00005	0.00010	58.2-95.1	29.1-107	29.1	37.8-101	10-124	30
Acenaphthylene^	2,300	NRO	85	420	0.21	1.05	0.1250	0.1250	0.00500	0.00500	44.7-107	22.5-11	32.7	30.7-105	10-139	30
Anthracene	23,000	NRO	12,000	59,000	2.1	10.5	0.0250	0.0250	0.00005	0.00010	58-93.7	44.7-107	28.1	40-100	10-126	30
Benz(a)anthracene	0.9	NRO	2	8.00	0.00013	0.00065	0.0250	0.0250	0.00005	0.00010	67.3-107	33.5-136	25.4	60-110	12-135	30
Benzo(a)pyrene	0.003	0.009	8	82	0.0002	0.002	0.0250	0.0250	0.00005	0.00010	64.1-101	28-137	28.7	60-110	10-128	30
Benzo(b)fluoranthene	0.09	NRO	5	25	0.00018	0.0009	0.0250	0.0250	0.00005	0.00010	72.5-104	28.8-140	24.1	60-110	10-150	30
Benzo(g,h,i)perylene^	0.9	NRO	27000	130,000	0.21	1.05	0.0250	0.0250	0.00005	0.00010	70.1-107	29.4-145	24.9	60-110	10-116	30
Benzo(k)fluoranthene	2,300	NRO	49	250	0.00017	0.00085	0.0250	0.0250	0.00005	0.00010	71.7-103	57.7-112	21.5	61.8-109	10-159	30
Chrysene	88	NRO	160	800	0.0015	0.0075	0.0250	0.0250	0.00005	0.00010	73-105	25.7-143	26.5	60-110	10-199	30
Dibenzo(a,h)anthracene	NRO	NRO	2	7.6	0.0003	0.0015	0.0250	0.0250	0.00005	0.00010	68.7-99.7	21-167	20	60-110	10-110	30
Fluoranthene	3,100	NRO	4,300	21,000	0.28	1.4	0.0250	0.0250	0.00005	0.00010	63-101	35-131	28.3	60-110	14-123	30
Fluorene	3,100	NRO	560	2800	0.28	1.4	0.0250	0.0250	0.00005	0.00010	61.5-94.3	35.4-107	28.1	60-107	10-142	30
Indeno(1,2,3-cd)pyrene	0.9	NRO	14	69	0.00043	0.00215	0.0250	0.0250	0.00005	0.00010	63.9-110	31.1-124	24.3	53.3-112	10-116	30
Naphthalene	0.09	NRO	12	18	0.14	0.22	0.0250	0.0250	0.00005	0.00010	55.2-98.5	14.5-118	34.7	32.3-104	10-122	30
Phenanthrene^	2300	NRO	200	1000	0.21	1.05	0.0250	0.0250	0.00005	0.00010	62.9-98.5	27.2-129	33.8	45-100	10-155	30
Pyrene	2,300	NRO	4,200	21,000	0.21	1.05	0.0250	0.0250	0.00005	0.00010	63.2-102	34.6-128	29	60-110	10-140	30

Notes

* Illinois EPA Tier 1 Soil Remediation Objectives (SROs): 35 IAC 742, Appendix B, Table A (Residential)

All soil results in parts per million (mg/Kg) based on dry weight unless noted otherwise.
All groundwater results in parts per million (mg/L) unless noted otherwise.
NRO = No Remediation Objective
^-Non-TACO Chemical. Limits prepared by IEPA Toxicity Assessment Unit - 01/06/09.
MDL is the method detection limit
PQL is the reporting limit which will be corrected based on the moisture in the samples
EMT does not have accuracy or precision values. EMT has included the recovery levels for the laboratory control sample (LCS), the matrix spike/matrix spike dup (MS/MSD) and the %RPD or error between the MS/MSD. The LCS is a blank spike and indicates accuracy for the method while the MS/MSD indicate the accuracy for matrices. The RPD indicates the precision. These values change routinely as they are statistically generated.

Table 3D - Analytical Parameters, Laboratory Reporting Values, IEPA TACO Soil and Groundwater Objectives, and Laboratory Accuracy and Precision Values
TOD AREA REDEVELOPMENT
Blue Island, Illinois

Chlorinated Pesticides and PCBs																						
Chemical Name	IEPA TACO SOIL AND GROUNDWATER OBJECTIVES						LABORATORY DETECTION LIMITS				Soil						Groundwater					
	Exposure Route-Specific SROs*(mg/kg)		Soil Component of GW Ingestion Route*(mg/kg)		GRO (mg/L)*		Soil (mg/kg)		Groundwater (mg/L)		LCS recovery %		MS/MSD recovery %		RPD %		LCS recovery %		MS/MSD recovery %		RPD %	
	Residential										Low	High	Low	High			Low	High	Low	High		
	Ingestion	Inhalation	Class I	Class II	Class I	Class II	MDL	PQL	MDL	PQL												
4,4-DDD	3	NRO	16	80	0.014	0.07	0.0025	0.01	0.000008	0.00002	58.3	143	43.6	123	50		71.3	107	43.3	105	19.8	
4,4-DDE	2	NRO	54	270	0.01	0.05	0.0025	0.01	0.000008	0.00002	41.8	136	34.4	120	50		60	104	27.6	113	15	
4,4-DDT	2	NRO	32	160	0.006	0.03	0.00267	0.01	0.000008	0.00002	66.6	152	30	143	50		69.3	108	60	97.9	18	
Alachlor	8	NRO	0.04	0.2	0.002	0.01	0.0025	0.01	0.000008	0.00002	40	140	30	150	50		46.4	119	40	130	50	
Aldrin	0.04	3	0.5	2.5	0.014	0.07	0.003	0.01	0.000008	0.00002	35.1	133	30	118	50		45.3	105	51.4	89.6	18	
alpha-BHC	0.1	0.8	0.0005	0.003	0.00011	0.00055	0.0025	0.01	0.000008	0.00002	30.3	115	32.7	107	50		40.2	86.4	27.4	98	25	
Atrazine	2700	NRO	0.066	0.33	0.003	0.015	0.0025	0.025	0.000045	0.00025	40	140	30	150	50		54.6	121	40	130	50	
beta-BHC	NRO	NRO	NRO	NRO	NRO	NRO	0.0025	0.01	0.000008	0.00002	41.5	153	30	150	50		57.4	121	34.5	107	21	
Chlordane	1.8	72	10	48	0.002	0.01	0.0158	0.03	0.000036	0.0002	40	140	30	150	50		40	130	40	130	50	
delta-BHC	NRO	NRO	NRO	NRO	NRO	NRO	0.0025	0.01	0.000008	0.00002	40	109	30	127	50		46.8	104	18.9	136	17	
Dieldrin	0.04	1	0.004	0.02	0.009	0.045	0.0025	0.01	0.000008	0.00002	51.3	137	34.4	122	50		62.5	107	41.7	122	17	
Endosulfan I	470	NRO	18	90	0.042	0.21	0.00314	0.01	0.000008	0.00002	45.1	140	39.4	114	50		58.3	107	53.6	98.4	15	
Endosulfan II	NRO	NRO	18	90	0.042	0.21	0.0025	0.01	0.000008	0.00002	45.3	114	30	122	50		63.4	109	47.2	114	50	
Endosulfan sulfate	NRO	NRO	NRO	NRO	NRO	NRO	0.0025	0.01	0.000008	0.00002	40	115	30	121	50		40.6	111	10.6	137	17	
Endrin	23	NRO	1	5	0.002	0.01	0.0025	0.01	0.000008	0.00002	44.7	154	36.1	134	50		65	119	37.2	145	16	
Endrin aldehyde	NRO	NRO	NRO	NRO	NRO	NRO	0.00274	0.01	0.000008	0.00002	40	121	30	136	50		48.1	112	44	112	21	
Endrin ketone	NRO	NRO	NRO	NRO	NRO	NRO	-	-	-	-	-	-	-	-	-		-	-	-	-	-	
gamma-BHC	0.5	NRO	0.009	0.047	0.0002	0.001	0.0025	0.01	0.000008	0.00002	40	116	40.1	111	50		39.9	93.1	24.9	128	42	
Heptachlor	0.1	0.1	23	110	0.0004	0.002	0.0025	0.01	0.000008	0.00002	43.7	130	43.6	120	50		45.2	96	33.5	127	16	
Heptachlor epoxide	0.07	5	0.7	3.3	0.0002	0.001	0.00265	0.01	0.000008	0.00002	37.9	131	37.4	125	50		57.1	104	48.7	111	15	
Methoxychlor	390	NRO	160	780	0.04	0.2	0.00282	0.01	0.000008	0.00002	40	142	30	150	50		47	120	26.1	147	20	
Simazine	390	NRO	0.04	0.37	0.004	0.04	0.0025	0.025	0.00006	0.00025	40	140	30	150	50		45	121	40	130	50	
Toxaphene	0.6	89	31	150	0.003	0.015	0.106	0.213	0.000211	0.00105	40	140	30	150	50		30	130	41	126	50	

Table 3D - Analytical Parameters, Laboratory Reporting Values, IEPA TACO Soil and Groundwater Objectives, and Laboratory Accuracy and Precision Values
TOD AREA REDEVELOPMENT
Blue Island, Illinois

Chlorinated Pesticides and PCBs																					
Chemical Name	IEPA TACO SOIL AND GROUNDWATER OBJECTIVES						LABORATORY DETECTION LIMITS				Soil					Groundwater				
	Exposure Route-Specific SROs*(mg/kg)		Soil Component of GW Ingestion Route*(mg/kg)		GRO (mg/L)*		Soil (mg/kg)		Groundwater (mg/L)		LCS recovery %		MS/MSD recovery %		RPD %	LCS recovery %		MS/MSD recovery %		RPD %
	Residential																			
	Ingestion	Inhalation	Class I	Class II	Class I	Class II	MDL	PQL	MDL	PQL	Low	High	Low	High		Low	High	Low	High	
Aroclor 1016	1	NRO	NRO	NRO	0.0005	0.0025	0.0001	0.0001	3.9E-08	0	59.4	178	28.4	192	22.6	23	118	5.73	146	15.6
Aroclor 1221	1	NRO	NRO	NRO	0.0005	0.0025	0.0001	0.0001	1.15E-07	0	40	140	30	150	50	15	178	15	178	50
Aroclor 1232	1	NRO	NRO	NRO	0.0005	0.0025	0.0001	0.0001	5.1E-08	0	40	140	30	150	50	10	215	10	215	50
Aroclor 1242	1	NRO	NRO	NRO	0.0005	0.0025	0.0001	0.0001	6.5E-08	0	40	140	30	150	50	39	150	39	150	50
Aroclor 1248	1	NRO	NRO	NRO	0.0005	0.0025	0.0001	0.0001	6.4E-08	0	62	104	56	141	50	38	158	38	158	50
Aroclor 1254	1	NRO	NRO	NRO	0.0005	0.0025	0.0001	0.0001	1.06E-07	0	41	107	30	150	50	29	131	29	131	18
Aroclor 1260	1	NRO	NRO	NRO	0.0005	0.0025	0.0001	0.0001	5E-08	0	61.4	206	40.9	179	23.4	41.4	133	39.8	132	12.1
Total Aroclors	1	NRO	NRO	NRO	0.0005	0.0025	0.0007	0.0007	4.9E-07	0	0	0	0	0	0	0	0	0	0	0

Notes

* Illinois EPA Tier 1 Soil Remediation Objectives (SROs): 35 IAC 742, Appendix B, Table A (Residential)

All soil results in parts per million (mg/Kg) based on dry weight unless noted otherwise.
All groundwater results in parts per million (mg/L) unless noted otherwise.
NRO = No Remediation Objective
^--Non-TACO Chemical. Limits prepared by IEPA Toxicity Assessment Unit - 01/06/09.
MDL is the method detection limit
PQL is the reporting limit which will be corrected based on the moisture in the samples
EMT does not have accuracy or precision values. EMT has included the recovery levels for the laboratory control sample (LCS), the matrix spike/matrix spike dup (MS/MSD) and the %RPD or error between the MS/MSD. The LCS is a blank spike and indicates accuracy for the method while the MS/MSD indicate the accuracy for matrices. The RPD indicates the precision. These values change routinely as they are statistically generated.

Table 3E - Analytical Parameters, Laboratory Reporting Values, IEPA TACO Soil and Groundwater Objectives, and Laboratory Accuracy and Precision Values
TOD AREA REDEVELOPMENT
Blue Island, Illinois

Chlorinated Herbicides Analytical Results																					
Chemical Name	IEPA TACO SOIL AND GROUNDWATER OBJECTIVES						LABORATORY DETECTION				Soil						Groundwater				
	Exposure Route-Specific SROs*(mg/kg)		Soil Component of GW Ingestion Route*(mg/kg)		GRO (mg/L)^		Soil (mg/kg)		Groundwater (mg/L)		LCS recovery %		MS/MSD recovery %		RPD %	LCS recovery %		MS/MSD recovery %		RPD %
	Residential																				
	Ingestion	Inhalation	Class I	Class II	Class I	Class II	MDL	PQL	MDL	PQL	Low	High	Low	High		Low	High	Low	High	
2,4,5-T^	NRO	NRO	5.2	26	0.28	1.4	0.0264	0.08	0.00402	0.025	38.4	118	20	150	30	78.7	112	30	120	30
2,4,5-TP (Silvex)	630	NRO	11	55	0.05	0.25	0.0247	0.074	0.00977	0.025	32.7	110	45.4	83.6	30	56.7	120	57.1	126	30
2,4-D	780	NRO	1.5	7.7	0.07	0.35	0.0201	0.06	0.00641	0.025	36.4	111	34.1	88.9	30	54.7	112	57	127	44.3
2,4-DB	NRO	NRO	NRO	NRO	NRO	NRO	0.0197	0.059	0.00312	0.025	55.2	111	20	150	30	85.2	106	30	120	30
Dalapon	2,300	NRO	0.85	8.5	0.2	2.0	0.55	1.652	20	60	40	100	71.4	191	30	60	120	30	120	30
Dicamba	NRO	NRO	NRO	NRO	NRO	NRO	0.0196	0.059	0.00639	0.1	53.3	131	10	149	30	60.1	107	30	120	30
Dichlorprop	NRO	NRO	NRO	NRO	NRO	NRO	0.0183	0.055	0.00919	0.0276	46.3	126	10	140	30	71.3	110	30	120	30
Dinoseb	78	NRO	0.34	3.4	0.007	0.07	0.0356	0.107	0.00296	0.025	41.9	109	10	85.4	30	45.4	111	30	120	30
MCPA	NRO	NRO	NRO	NRO	NRO	NRO	0.0191	0.057	0.00223	0.025	62.7	99.3	10	150	30	81.5	110	30	120	30
MCPP	NRO	NRO	NRO	NRO	NRO	NRO	0.0295	0.089	0.0046	0.025	60.5	100	10	150	30	81.1	105	30	120	30
Picloram	5,500	NRO	2	20	0.5	5.0	0.0238	0.071	0.00924	0.0277	50.5	101	10	110	30	49.4	89.2	45.9	85.6	13.8

Notes

* Illinois EPA Tier 1 Soil Remediation Objectives (SROs); 35 IAC 742, Appendix B, Table A (Residential)

All soil results in parts per million (mg/Kg) based on dry weight unless noted otherwise.

All groundwater results in parts per million (mg/L) unless noted otherwise.
NRO = No Remediation Objective

^--Non-TACO Chemical. Limits prepared by IEPA Toxicity Assessment Unit - 01/05/09.

MDL is the method detection limit

PQL is the reporting limit which will be corrected based on the moisture in the samples
EMT does not have accuracy or precision values. EMT has included the recovery levels for the laboratory control sample (LCS), the matrix spike/matrix spike dup (MS/MSD) and the %RPD or error between the MS/MSD. The LCS is a blank spike and indicates accuracy for the method while the MS/MSD indicate the accuracy for matrices. The RPD indicates the precision. These values change routinely as they are statistically generated.

Table 3G - Laboratory Reporting Values, Laboratory Accuracy and Precision Values
TOD AREA REDEVELOPMENT
Blue Island, Illinois

Asbestos and Lead in Paint

Analyte	Detection Limit	Precision (Relative Standard Deviation)	Accuracy (Recovery)
Lead in Paint	0.01% (with 0.2 gm sample)	0-25%	75-125%
Asbestos	1%	*Variable by sample type, asbestos concentration and method of quantitation*	*Variable by sample type, asbestos concentration and method of quantitation*

Table 4
Field and Lab QA/QC Sample Requirements
Brownfields Assessment Project
Project Name: 2007 USEPA Brownfields Assessment – City Of Blue Island TOD Redevelopment Area BF-00E42601-0

	QC Sample Type	Frequency of Sample/Analysis	Details
Field Samples	Duplicate Samples	1 duplicate per 20 samples per matrix, or 1 duplicate per sample matrix if fewer than 20 samples	Duplicate sample to be collected by the same methods at the same time as the original sample. Used to verify sample and analytical reproducibility.
	Equipment Blanks	1 equipment blank per 20 samples, minimum 1 equipment blank per day per sample matrix	Distilled water placed into contact with sampling equipment. Used to assess quality of data from field sampling and decontamination procedures.
	Trip Blanks	1 trip blank per cooler containing samples for VOC analysis for water samples	Laboratory prepared organic-free blank to assess potential contamination during sample container shipment and storage.
		1 trip blank per site or per lot of bottles for soils	If soil VOC samples are to be preserved with methanol and/or sodium bisulfate, one set of preserved vials will be included to assess potential contamination during sample container shipment and storage.
Lab Samples	Matrix Spike/ Matrix Spike Duplicate	1 MS/MSD per 20 or fewer samples per matrix	Laboratory spiked sample to evaluate matrix and measurement methodology.
	Method Blanks	1 method blank per batch of samples prepared, or per lab SOP	Laboratory blank sample to assess potential for contamination from laboratory instruments or procedures.
	Laboratory Control Samples and Duplicates	Analyzed as per method requirements and laboratory SOPs	Evaluates laboratory reproducibility.

Table 5 – Sample Container, Preservation and Holding Time Requirements

Matrix	Analysis	Container	Preservation	Holding Time
SOIL	Metals	1 – 4 oz glass jar	Cool to 4° C	6 months; mercury 28 days; chromium VI 24 hours
	Volatile Organic Compounds	2 – 40 ml glass vials and with 10 grams of soil each	methanol, Cool to 4° C	14 days
	Volatile Organic Compounds using EnCore sampling methods	2 EnCore tubes or sampling devices	Cool to 4° C, requires preservation at the lab within 48 hours of collection	14 days
	Semivolatile Organic Compounds	1 – 4 oz glass jar	Cool to 4° C	14 days
	Pesticides, Herbicides and PCBs	1 – 4 oz glass jar	Cool to 4° C	14 days
	Cyanide, Total	1 – 4 oz glass jar	Cool to 4° C	14 days
WATER	Metals, Total and Field Filtered	1 – 500 ml plastic bottle *Separate bottle for CrVI+ due to short holding time*	HNO3 to pH<2, cool to 4° C	6 months; mercury 28 days; CR VI + is 24 hours
	Volatile Organic Compounds	3 – 40 ml level 2 glass vials	Cool to 4° C HCl to pH <2	14 days
	Semivolatile Organic Compounds	1 – 1 L level 2 amber glass bottle	Cool to 4° C	7 days
	Polynuclear Aromatic Compounds	1 –1 L level 2 amber glass bottle	Cool to 4° C	7 days
	Pesticides, Herbicides and PCBs	1 – 1 L level 2 amber glass bottle each	Cool to 4° C	7 days
	Cyanide, Total	1 – 1 L level 2 glass bottle	NaOH to pH>12, 0.6 g Ascorbic Acid*	14 days
Bulk	Asbestos	Resealable baggie	None	None
Paint Chips	Lead	Resealable baggie	None	None
Air	TO 14 VOCs	Summa Canister	None	7 days

N/A

PREVENTATIVE MAINTENANCE

TABLE 6a

INSTRUMENTS	MAINTENANCE PROCEDURES/SCHEDULE	SPARE PARTS IN STOCK
Photovac MicroTIP Photoionization Detector	1. Calibrate beginning and end of each day and as necessary during use. 2. Check battery, and recharge when low. 3. Clean lamp window every 24 hours of operation. 4. Replace dust filter every 240 hours of operation. 5. Replace sample pump every 5000 hours of operation.	1. Battery charger 2. Spare lamps 3. Spare filter cartridges
Thermo Environmental Model 580B Photoionization Detector	1. Calibrate beginning and end of each day, and as necessary during use. 2. Check battery, and recharge when low. 3. Clean lamp and dust filter as needed. 4. Replace water traps if they become wet.	1. Spare lamps 2. Spare dust filters.
Field Gas Chromatograph	1. Change injector septa daily. 2. Repack column when separation and linearity becomes poor. 3. Clean PID lamp before each initial calibration; change when sensitivity lost. 4. Clean injector port/liner weekly.	1. Septa 2. Empty columns and column packing 3. PID lamps 4. Injector lines
pH Meter	1. Calibrate beginning and end of each day, and as necessary during use. 2. Replace electrodes as needed.	1. pH buffers 2. Batteries 3. Spare electrodes
Conductivity Meter	1. Calibrate beginning and end of each day, and as necessary during use. 2. Check redline and replace batteries if does not calibrate.	1. Batteries
HNu Model Photoionization Detector	1. Calibrate beginning and end of each day, and as necessary during use. 2. Check battery, and recharge when low. 3. Clean UV lamp, ion chamber, and fan if calibration falls outside 10% of the calibration standard, or if readings are erratic.	1. Battery charger 2. Spare lamps

QA OBJECTIVES FOR FIELD MEASUREMENTS

PARAMETER	METHOD[1] REFERENCE	PRECISION[2]	ACCURACY[3]	COMPLETENESS
WATER				
Standing Water Levels	Solinist Water Level Indicator	±0.01 ft.	0.005 ft.	95%
Temperature	E170., Mercury Thermometer or Electronic Temperature Probe	±0.5°C	1.0°C	95%
Conductivity	E120.1, Electrometric	±25	10 umho/cm^2	95%
pH	E150.1, Electometric	±0.1 pH units	0.05 pH units	95%
Turbidity	E180.1	10 NTU[4]	0.5 NTU[4]	95%
Redox Potential	ASTM 1498-93	±10mV	10 mV	95%
Dissolved Oxygen	SM-A4500	±0.05 mg/L	±0.1 mg/L	95%
SOIL				
Bulk Density	ASTM D-1556	NPM	NPM	95%
Soil pH	SW-9045	±0.1 pH units	0.05 pH units	95%

NOTES:

1. Methods: E - *Method for Chemical Analysis for Water and Wastes* (U.S. EPA, 1983).
   SW - *Test for the Evaluation of Solid Waste*, SW-846, U.S. EPA, September 1986.
   SM - *Standard Methods for Examination of the Water and Wastewater*, 18th ed. (APHA, 1992).
   ASTM - *Annual Book of ASTM Standards*, American Society of Testing and Materials, 1995.
2. Expressed as the acceptable deviation from the Scale.
3. Expected based on equipment manufacturer specifications.
4. Acceptable accuracy and precision based on the range of measured. NTUs(nephelometric turbidity units). NPM - Not Part of Method

TABLE 6